Stephen Rushmore.

CESAREAN SECTION

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PREFACE

THE reason for this book lies in the fact that, while it is recognized among well trained obstetricians that Cesarean section is one of the most valuable operations yet devised both as a life and health saving procedure for both mother and child, the results which follow the operation as it is performed in general practice are such as to suggest that comparatively few surgeons give their patients sufficient study to determine whether delivery is best to be accomplished by Cesarean section or by some other means.

The purpose of this volume is to bring out definitely in the first place the indications and contra-indications for the operation, as well as the methods of operation, in the hope that it may have some influence in diminishing the prevalent abuse of one of the most valuable obstetric procedures. I believe at the present time that Cesarean section is so commonly performed on patients who are improper risks for one reason or another that obstetric mortality and morbidity are increased rather than diminished by the operation, and that the true value of the operation can be appreciated only when it is applied to properly selected patients by competent operators.

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Under the term *cesarean section,* or laparohysterotomy, are included the various operations by means of which the delivery of the child is effected through an incision in the abdominal and uterine walls. The name is not properly applied to operations for the removal of the child from the abdominal cavity after rupture of the uterus or for the delivery of a child in cases of abdominal pregnancy, but is restricted to the abdominal delivery of a child normally situated in utero.

The origin of the term "cesarean" is more or less obscure. For a long time it was popularly believed that Julius Caesar was brought into the world by this means and that he obtained his name from the operation by which his birth was accomplished (a cesa matris uteri). It is almost certain, however, that this derivation of the name is incorrect, since his mother, Julia, lived many years after his birth, as is proven by his letters to her, and furthermore, at the time when Caesar lived the operation is not known to have been performed on the living woman, at least in countries under Roman rule. It is also a fact that Julius Caesar was not the first of his name, since there is mention in Roman history of a priest named Caesar, who lived at a considerably earlier period, which proves at least that the name did not owe its origin to the method of Caesar's birth.

Two other plausible explanations for the origin of the name have been given: first, that the term is derived from the latin verb cedere (to cut), and, therefore, that it simply implies delivery by means of cutting, which is, of course, possible, since children delivered from dead mothers by abdominal section were known as "cesones." It seems more

probable, however, that the following explanation is the correct one. In 715 B. C. Numa Pompilius, the king of Rome, codified the Roman law, and in this lex regia, as it was called, it was ordered that abdominal section should be performed on all women who died when far advanced in pregnancy, even in cases when there was no chance of survival for the child, so that the mother and child might be buried separately. The lex regia became the lex cesarea under the rule of the emperors and the operation became known as the cesarean operation.

The antiquity of the operation on the dead is thus clearly established under early Roman civilization, and there is some slight evidence that it may have been known to the early Egyptians. Furthermore, it is referred to in the myths and folk lore of the early European races who were much less civilized, although not in terms which justify any belief that it was performed on the living woman. It is, therefore, fair to assume that a large proportion, if not all, of the early races, recognized the propriety of cesarean section on women who died late in pregnancy, in the hope of preserving a fetal life which might be of value to the community.

Cesarean section on the living is of more recent date, but its beginnings are utterly obscure. It is possible, however, that it was known to certain of the early races. Various authorities are inclined to believe that certain passages in the Talmud have reference to the operation on the living, and the children delivered through the flanks of their mothers were given the name "Jotze Dofan" by the ancient Jews, although there is no evidence as to the fact of the mothers surviving the operation or that they were living when the operation was undertaken.

Perhaps the strongest suggestion of the possible early development of cesarean section on the living among uncivilized peoples is furnished by the operation witnessed by Dr. Felkin in Uganda in 1879, performed by a native specialist. The operator evidently possessed distinctly more knowledge of asepsis than his civilized confrères of that period, since he washed his hands and the field of operation with banana wine before operating, instead of deferring the cleansing of his hands until after operation, as was more or less common in civilized practice at that time. The patient was anesthetized by being made drunk with the same preparation. A rapid incision of the abdominal wall and uterus was done, the child removed and the cord cut. The placenta was then removed, the cervix dilated from above, and the uterus was massaged and compressed to check hemorrhage. The peritoneal cavity was cleansed of liquor and blood by raising the patient up, and then the abdomen was closed by means of pin and figure of eight sutures. The wound was dressed

with a paste of crushed herbs. The wound healed in eleven days, and the convalescence was only slightly febrile, with the temperature remaining under 101° throughout the whole puerperium. Such a well developed technic suggests that the operation had been under development for a long time, and it seems very possible that cesarean section may have been practised among certain barbarous races with success, perhaps for centuries, while among civilized surgeons it remained an operation of the greatest danger, only to be attempted as a last resort after the failure of every other known expedient to accomplish delivery.

The authentic history of cesarean section may be said to cover four periods, the first extending from the earliest times to the beginning of the sixteenth century; the second from the year 1500 to 1876, when Porro published his method of amputation of the uterus following cesarean section; the third period begins with the year 1876 and extends to 1907, and includes the period of development of the so-called conservative cesarean operation; and the fourth period, from 1907 to date, covers the development of the extraperitoneal operation in cases not considered suitable for the classical conservative cesarean.

First Period: *previous to 1500.*—During this period the operation was occasionally performed on women who had died during the latter part of pregnancy, in the hope of obtaining a living child. There is no evidence to warrant the belief that the operation was performed on living women during this time, at least in European races, and it seems hardly possible that so radical a procedure should have been undertaken and leave no trace in the writings of the times. Several authorities believe that certain passages in the Talmud may be so interpreted as to point to its performance on the living amongst the Jews, but the evidence is, to say the least, unconvincing and lacking in authority.

Second Period: *1500 to 1876.*—The second period extends from 1500 to 1876. During this time the operation was occasionally performed on the living as an operation of last resort when all other means of delivery had been tried and failed, and the results, as would naturally be expected in the light of our modern experience, were so appalling that the operation was looked on as almost sure to be fatal, until in 1876 Porro described his operation, which altered the prognosis very materially for the better.

Caspar Bauhin (1588) states that the first cesarean section upon a living woman was performed in 1500, when Jacob Nufer, a castrator of pigs at Sigerhausen, Switzerland, operated successfully upon his own wife, after a dozen midwives and several barbers had failed to deliver her, and had given up the task as hopeless. Inasmuch as the patient

subsequently had five spontaneous labors, it is fair to infer that the operation was not a true cesarean section, but in all probability the removal of an extra-uterine child from the abdominal cavity.

François Rousset, in 1581, wrote a monograph on the subject, in which he gave the histories of fifteen cesarean operations collected from various sources. Several of these cases were not authentic, and it seems probable that the majority of the others were operations for advanced extra-uterine pregnancy. In spite of the fact that few, if any, of these cases were true cesarean sections, this treatise had one great merit, in that it brought the operation to the attention of the medical profession and suggested the possibility of its performance on the living woman.

The first generally accepted cesarean section was performed in 1610, by Trautmann of Wittenberg, on a woman with hernia of the gravid uterus. From this time on, the operation was performed from time to time on patients in whom delivery seemed hopeless, after repeated attempts had been made by other methods and had failed. In spite of the frightful mortality which attended the operation and which aroused the opposition of many of the leading obstetricians of Europe, the operation gradually gained a foothold and was accepted as a justifiable procedure in the hopeless cases where other methods had failed and the only alternatives were cesarean section or permitting the patient to die undelivered. The attitude of the Catholic Church in favoring the operation, because it gave an opportunity for baptism of the child, had much to do with the development of the operation, and the operation was performed with increasing frequency, although the results continued to be so bad that it remained an operation of last resort, only to be undertaken after the failure to effect pelvic delivery by all known methods, or in the rare cases when it was evident that the pelvic obstruction was so extreme as to render attempts at delivery per vaginam utterly hopeless.

During this period the technic of the operation was exceedingly crude, which, together with the fact that the operation was only performed on women who would today be considered bad, if not unjustifiable, operative risks, unless a subsequent hysterectomy were performed, naturally gave bad results. The abdominal wall and uterus were incised and the child and placenta extracted. The contraction and retraction of the uterine walls were relied on to control hemorrhage, the uterine incision not being sutured, and the uterus was dropped back into the abdominal cavity to act as a persistent source of hemorrhage and peritoneal infection. Sutures were first used by Lebas in 1769, but did not come into general use until Sänger published his article describing his technic in 1882. The majority of the women died of hemorrhage or infection, and the statistics of the

operation were so bad that in 1777 it was almost entirely superseded by symphyseotomy, only to be rehabilitated at a later date when symphyseotomy fell into disrepute on account of the bad results which attended its performance. Few operations have passed through such a discouraging early stage, to become acknowledged as among the greatest life saving procedures of modern surgery.

Kayser (Copenhagen, 1844) found a mortality of 62 per cent. for the previous eighty years. Murphy (London, 1862) reported 86 per cent. mortality in Great Britain. Meyer (1867) collected 1605 cases from the literature with a mortality of 54 per cent. Budin (1876) states that not a single successful cesarean section was performed in Paris between the years 1787 and 1876, and Späth (1877) reported a similar condition in Vienna. Harris (1878) reported that of eighty cases operated on in the United States up to that time, 52.5 per cent. died.

Such results would cause the permanent abandonment of most operations, and it was only due to the fact that an abdominal delivery gave the only possible chance for life to a certain number of unfortunate women, that the operation was not permanently discarded. Such poor results were obtained when the operation was performed by surgeons that Harris pointed out that the patient's chances of recovery were better when the patient, unable to endure the pain of labor longer, performed the operation on herself, or when the abdomen was ripped open by the horn of an infuriated bull; and he collected nine such cases from the literature, with five recoveries, in contrast to eleven cesarean sections performed in the City of New York during the same period, with one recovery.

Third Period: *1876 to 1907.*—The third period began with the year 1876, when Porro of Pavia, recognizing that the greatest risks to the patient arose from hemorrhage from the open vessels of the uterine walls and from the escape of infected lochia into the peritoneal cavity, advised amputation of the body of the uterus and fixation of the stump in the lower angle of the abdominal wound, in order to lessen the dangers of hemorrhage and infection, thus avoiding the dangers which arose from returning the unsutured, usually infected uterus to the abdominal cavity.

This procedure was followed by such an improvement in the results of operation that it soon became very popular, and in 1890 Harris collected 264 operations from the literature. Amputation of the pregnant uterus had been done on a case of multiple fibroids of the uterus by Storer of Boston in 1868, or eight years before Porro described his operation. The result in this case was fatal and the operator did not

apparently realize the importance of the innovation, as applied to cases of uncomplicated cesarean section, and, therefore, the credit for bringing it to the attention of the medical world as a possible life saving procedure belongs to Porro, although he was not the first to perform the operation.

Sänger, in 1882, revolutionized the operation and paved the way for its modern development by calling attention to the importance of closing the uterine incision by suture, instead of dropping the unsutured organ back into the abdomen, to be a source of danger to the patient, or removing it and thus rendering her sterile. Since Sänger's operation led to the preservation of the uterus, it has been designated as the conservative, in contradistinction to the Porro, or radical, cesarean section.

The increasing perfection of surgical technic has led to more and more satisfactory results for the conservative operation, until at the present time it may be considered as the ideal operation in all cases in which no special indication exists, calling for the removal of the uterus, while the Porro, or its modifications, is now reserved for special cases which call for special treatment.

The Porro operation has been modified as the technic of gynecological operations has been improved, and the classical operation, as described by him, is now seldom performed. At the present time the common technic employed in cases of supravaginal amputation of the non-pregnant uterus has been substituted for the operation, as described by Porro. The uterus is amputated as formerly, but the cervical stump, instead of being fixed in the lower end of the abdominal incision, is covered by a flap of peritoneum and dropped back into the abdominal cavity and the abdominal wound is closed. This method gives equally good immediate results and a much improved ultimate result, the long period of suppuration, which was inevitable under the original Porro technic, being done away with.

In a small number of cases, particularly when pregnancy is complicated by operable carcinoma of the cervix, a panhysterectomy is performed, the entire uterus, including the cervix, being removed. This operation was first attempted by Bischoff, and for a time was freely performed as an improvement over supravaginal amputation. The somewhat increased mortality which attends its use has led, however, to its practical abandonment, except in the comparatively rare cases of operable carcinoma complicating advanced pregnancy, although it is still occasionally advocated in cases of frank uterine infection. It is probable in these cases, however, that the immediate mortality consequent on the more severe operative procedure will more than compensate for the occasional life saved by the removal of the infected cervix.

Fourth Period: *1907 to date.*—The fourth period began in 1907, when Frank of Cologne, who had become dissatisfied with the results of the conservative cesarean section when performed on women frankly infected prior to the operation, or in doubtful cases in which proper asepsis had not been observed during labor, although infection was not definitely demonstrable, reported thirteen cases on whom he had operated by a new method.

In Frank's operation a transverse incision was made through the lower abdominal wall, two or three inches above the symphysis down to the peritoneum. After the recti muscles were severed, the peritoneum was separated from the bladder and anterior surface of the uterus by gauze dissection, until enough of the lower uterine segment was exposed to permit of a sufficiently large incision for the extraction of the child. The placenta was then removed and the uterine and abdominal incisions closed. By this method, under ideal conditions, the whole operation can be performed extraperitoneally and the danger of peritoneal infection, which is very great in doubtful cases on whom the cesarean section is performed, is distinctly lessened. It must be said, however, that Frank's claim that the operation is safe, when the conservative operation is absolutely contra-indicated, has not stood the test of time, and that the results of the operation have not been as universally successful as he predicted, as is shown by the fact that the operation has been variously modified, some twenty different procedures to obtain the same result having been published in the twelve years since the operation was first described by him.

Available statistics would seem to show that in uninfected cases the conservative cesarean is at least as good an operation for both mother and child, since the difficulty of technic and the increased time required for the extraperitoneal operation render it relatively unsatisfactory for clean cases. Furthermore, even in frankly infected cases, it is yet to be proved that extraperitoneal section gives better results than delivery of the uterus from the abdomen before opening, followed by partial or total hysterectomy, in spite of the increase in operative shock in the latter operation. The only advantage lies in the preservation of the uterus for future childbearing, and in frankly infected cases this is more than made up for by the mortality from puerperal infection due to the retention of the infected uterus. It is, therefore, in the cases in which infection is suspected, but not proven, that the operation is indicated, and not in either the clean or definitely infected cases, it being unnecessary in the former group and inadequate in the latter.

Frank's operation was enthusiastically received in Germany, but its

early promise was not fulfilled. It was found in many cases, either that the peritoneum could not be separated from the underlying organs, or that it was torn during the attempt at separation, thus nullifying the supposed advantage of the operation from not opening the peritoneal cavity. In other cases the bladder was injured or extensive suppuration of the pelvic connective tissue resulted, so that the morbidity was high, and the mortality, while less than that obtained when the conservative operation was performed on infected cases and the uterus dropped back to act as a source of infection to the peritoneal cavity, was no lower than, if as low as, that obtained by hysterectomy.

Not satisfied with this showing, Latzko, Sellheim and other operators modified the operation, converting the so-called suprasymphyseal, extraperitoneal operation into a suprasymphyseal transperitoneal cesarean section. In this operation the abdomen is opened by a transverse incision and the uterus exposed, after which a transverse incision is made in the peritoneal covering of the uterus just above the reflexion over the bladder, extending to the insertions of the round ligaments on either side. The peritoneal flap is dissected up for a short distance from the anterior uterine wall and is then tightly sutured to the margins of the parietal peritoneum. The lower uterine segment is now freely exposed and is isolated completely from the peritoneal cavity, thus reducing to a minimum the danger of peritoneal infection. The bladder is now freed by blunt dissection from its attachments to the lower uterine segment, the latter is opened by a transverse incision, the child and placenta extracted, and the wounds are closed.

The results of these attempts to modify Frank's operation proved only partially satisfactory, and Döderlein attempted to revive the operation of laparo-elytrotomy, which had been first suggested in 1823, but had not been favorably received at that time, although it had been rehabilitated by Gaillard Thomas in 1871, only to be abandoned in favor of the classical cesarean section. In this operation a long oblique incision parallel to Poupart's ligament gives access to the pelvic connective tissue and the lateral aspect of the lower uterine segment, which is then incised, and the child extracted by forceps. Döderlein reported thirty-two cases in 1911 on whom he had performed this operation, but has discarded it since that time on account of certain very obvious disadvantages. Even in clean cases the healing of the wound proved complicated, and drainage was always necessary. In infected cases the almost sure infection of the pelvic connective tissue rendered a prolonged suppurative process inevitable and the patient only recovered, if at all, after a long, tedious

convalescence. The operation thus proved of no value in the very class of case for which it was primarily recommended.

Krönig was not satisfied with any of these modifications and claimed that their principal advantage lay, not in avoiding the peritoneal cavity, but in the fact that the uterine incision was in the thin lower segment, instead of in the thick contractile portion of the uterus. In the operation, as described by him, the abdomen is opened either by a longitudinal or transverse incision. The visceral peritoneum is then incised at the vesico-uterine reflexion, and the bladder is freely separated from the lower uterine segment. After the lower uterine segment is freely exposed, it is opened by means of a longitudinal median incision, and the child is extracted by forceps. The placenta is then removed and the uterine incision closed. The operation is completed by drawing the bladder back into place, and its peritoneal covering is sutured to the flap dissected up from the uterus in such a manner as to bury completely the entire uterine incision.

In 1915 Küstner reviewed the whole subject most carefully and reported his own modification, based on a personal experience of 112 operations. Up to the present time this operation seems to hold out a greater promise of success than any of the other modifications which have been suggested by the ingenuity of certain American surgeons, but the question is still sub judice whether any extraperitoneal operation is properly to be considered in any case in which the patient is believed to be frankly infected, hysterectomy being the most satisfactory procedure under such conditions. If further experience proves this to be the case the field for the employment of the extraperitoneal methods would seem to be limited to cases in which it is at least doubtful whether the uterus is infected, the great majority of whom will recover if operated on by the conservative method. It is, however, probable if the peritoneal cavity is protected against contamination in these cases by the adoption of one of the extraperitoneal operations, that the convalescence will be more comfortable, owing to the diminution of abdominal distention, since the uterus is often infected by an organism of low virulence, the introduction of which into the peritoneal cavity will interfere with the smoothness and comfort of convalescence, although perhaps it may not prove dangerous to life.

At the present time some authors, notably DeLee, are urging the abandonment of the classical section in favor of an extraperitoneal operation, even in clean cases, and claim improved results, at least in the comfort of the patient. It is still too early to pass on the justice of their claims, but my own experience with the classical operation, when

performed on healthy women under ideal conditions, leads me to believe that the extraperitoneal method has few, if any, advantages in such cases and is a more difficult surgical procedure. The results of any operation on unfit patients must be relatively unsatisfactory, to say the least, and it is possible that future experience will demonstrate that cesarean section by one of the extraperitoneal methods will prove the most satisfactory operation on all patients whose powers of resistance are below par from any cause, even though no infection is present. It is also admitted, even by the most ardent advocates of the extraperitoneal operation, that when operative speed is an object, as for instance in patients with profuse bleeding, or when the child is known to be in a precarious condition, the conservative operation is preferable, as it involves much less loss of time, a factor which is of great importance under these conditions.

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CHAPTER II

INDICATIONS FOR CESAREAN SECTION

Cesarean Section Originally an Operation of Last Resort—Results Better, the Earlier in Labor it is Performed—A Much Abused Procedure—Not Without Danger—Bad Results if Performed on Improper Cases—Indicated Only in Cases in Which Pelvic Delivery is Dangerous—Indications in Pre-aseptic Days—Increased Safety Under Modern Conditions—Modern Indications—Results Not Ideal Under Best Conditions—Indications—Pelvic Contraction—Absolute and Relative Indications—Examination of the Pelvis in Doubtful Cases—Palpation of Pelvic Cavity Under Anesthesia—Estimation of Fetal Head—Probable Character of Labor—Dilatation of Cervix—Molding Power of Fetal Head—Modified Trial of Labor in Doubtful Cases—Probable Effect of Labor on the Patient in Cases of Contracted Pelvis—Cardiac Conditions Complicating Labor in Contracted Pelvis—Pelves with a True Conjugate of 9 cm. or Over—Contraction of the Pelvic Outlet—Bibliography.

As was stated in the preceding chapter, cesarean section was originally employed only as an operation of last resort when no other means of delivery was possible, and was seldom or never resorted to, except in cases in which pelvic delivery had been repeatedly attempted and it was felt that the only hope of saving the patient lay in cesarean section. The results were exceedingly bad. With the advent of aseptic surgery and the modification of the technic of the operation by Sänger, the results, even in apparently desperate cases, showed a marked improvement, especially in the class of case in which delivery of the living child was recognized as impossible comparatively early in labor, and the operation was therefore undertaken before the patient was exhausted by prolonged labor or infected by repeated manipulation. The increased success which has attended the performance of cesarean section as an operation of election, instead of as an operation of last resort, has led to its employment in many cases, to the exclusion of methods of delivery better suited to the needs of the given patient, until at the present time it is the most abused obstetric operation, being performed by comparatively untrained surgeons on patients who present no real indication for it, under conditions which render it an exceedingly dangerous procedure. It is not at all unusual at the present time to see patients who have been subjected to cesarean section for no apparent reason, as far as physical examination shows, and the only logical conclusion seems to be that the operative indication has been a slow, though normal, labor, which the

attendant has hastened to end in the manner easiest for himself, though often not best for the patient. The increasing safety of abdominal surgery, as modern asepsis has developed, combined with the fact that the operation is much easier to perform than any but the easiest obstetric operations, has caused a loss of perspective, and today there is no question but that cesarean section is one of the most abused operations in surgery.

There seems to be an impression in the minds, both of the general medical and lay public, that cesarean section is a perfectly simple, safe operation which can always be guaranteed to give perfect results under all circumstances. The fact that abdominal surgery always carries with it a certain risk to the life of the patient, even in the most competent hands and under the best conditions, is entirely lost sight of, with the result that, instead of being chosen after careful consideration as being the safest and best method of delivery for the given patient, cesarean section is looked on by many poorly trained obstetricians and general surgeons, who do not pretend to have even a working knowledge of the fundamental principles of the obstetric art, as a panacea for all obstetric ills, and the lives of many women are sacrificed every year on account of this disregard for the interests of the patient, which results in the performance of many operations absolutely unjustifiable under the conditions present in the given case.

About three years ago my attention was called to the results of cesarean section in one of the smaller cities near Boston, and this led to a careful investigation of the results in several other communities, with the result that I am convinced that cesarean section, as performed by the local operators in small communities for the indications furnished by the local practitioner of obstetrics, is one of the most fatal of surgical operations. Even in the best hands under good surgical conditions, an occasional patient, who has not been in labor for more than a few hours and who has never been subjected to a vaginal examination, will become infected and die of peritonitis, infection apparently taking place in the uterine wound by extension from the vagina. When, however, the operation is performed late in labor, after many vaginal examinations, or after attempted vaginal delivery, the results, as would be expected, are much worse, and the operation should only be considered, under such circumstances, when no other means of delivery seems to be possible with due regard to the interests of both patients, although in doubtful cases the interests of the mother should be given precedence. It is, however, very common to hear of patients who have been subjected to operation after the ordinary obstetric operations have failed, and the wonder is

not that so many women die, but that any recover when operation is undertaken on unfavorable cases.

Presumably the ease with which the operation can be performed is the prime factor in the choice of cesarean section in improper cases, since, as compared with the ordinary obstetric operation, except perhaps an easy low forceps, cesarean section is the easiest method of delivery for the obstetrician and the safest operation for the child. It must be remembered, however, that cesarean section is an abdominal operation and that abdominal surgery is never entirely without danger; and furthermore cesarean section is a distinctly major operation, and for the patient at least it is not a simple procedure. It is then only indicated when, on account of certain conditions which are known to seriously increase the risks of a pelvic delivery to either mother or child, or both, either as regards life or health, a major surgical procedure is believed to be the safest method of delivery, and the risks which attend its performance have been carefully estimated and given due weight in the decision.

In the pre-antiseptic days cesarean section was considered so dangerous an operation that it was believed to be indicated only in cases in which the delivery of even a mutilated child was considered impossible.

Murphy, writing in 1862, gives the following indications for the operation:

(1) In the ovate deformity of the pelvis when the conjugate axis is less than two inches (rachitis).

(2) In the cordiform distortion from mollities ossium, when the distortion is extreme and craniotomy is either impracticable or so difficult that the safety of the mother cannot be secured (osteomalacia).

(3) When tumors are immovable and so occupy the pelvic cavity as to leave a space of only two inches between the tumor and the pelvis.

If these indications were followed at the present time, few cesarean sections would be performed, but I believe that the maternal death rate would be little, if any, higher than it is at present with the abuse of cesarean section which exists, although the fetal death rate would be much higher.

The development of the aseptic technic in surgery has made it possible to consider the rights of the child as well as the rights of the mother, and the position of cesarean section in modern obstetrics is due to the fact that, under proper conditions and in the hands of a competent operator, the risk attached to it is little greater than that of any other abdominal operation. It is, when performed as an operation of election, a justifiable procedure whenever a thorough examination demonstrates the fact that the child will be subjected to serious danger in case an at-

tempt at pelvic delivery is made, or that the health of the mother is likely to suffer sufficiently seriously from a pelvic delivery to warrant the somewhat increased risk that attends an abdominal delivery.

The modern indications for cesarean section, therefore, may be said to include all conditions which so complicate labor as to seriously threaten the life or health of either patient, and although the operation cannot be said to be without some risk to the maternal life, the risk is a comparatively small one under proper conditions and may properly be assumed for the sake of real advantage for either mother or child, though not for the convenience of the attendant or on account of the fact that he is not properly qualified to care for a situation which can be more safely dealt with by some other method by a trained obstetric surgeon, unless it is impossible to procure the services of a thoroughly qualified operator.

The results obtained by cesarean section, performed at the time of election (i.e., before labor begins, or early in labor), are so much better than the results of the secondary or late operations that it is evident that every patient should be carefully studied during the last month of pregnancy, in order that no indication which may properly call for cesarean section may be overlooked; so that, if the operation seems indicated, it may be performed at the time when the best results may be expected for both patients. In general practice this precaution is usually overlooked, and it is safe to say that the majority of cesarean operations are performed at a time when the dangers of the operation have been much increased, either by a long test of labor, by repeated vaginal examinations often conducted under doubtful asepsis, or by ineffectual attempts at pelvic delivery. It may be urged that the general practitioner is not qualified to determine the necessity of the elective operation, a fact which is undoubtedly true in most cases, since he has not been afforded the opportunity to acquire the special knowledge on which such a decision must be based; but that is no excuse, since it would ordinarily be a simple matter for him to refer every primipara, and every multipara whose previous obstetric history is questionable, to a well trained obstetrician for an opinion as to the proper method of delivery in the given case.

That the results of cesarean section are not ideal, even in competent hands, may be assumed from the statement made by Holmes several years ago, to the effect that any surgeon whose results showed a maternal mortality of more than five per cent should revise the indications for which he operates and should subject his operative technic to the closest scrutiny, since the occurrence of so high a mortality proved either that

he was operating on patients who were not in proper condition for cesarean section, or that his aseptic technic was inadequate. The statistics published by men of unquestioned operative ability and of good obstetric judgment show that the operation is attended by a mortality of from 2 to 4 per cent in all types of patients who are subjected to the operation, although several operators can show a series of 100 or more consecutive cases without mortality. A fatal result in a healthy patient operated on under good conditions should be extremely rare; but the recognition of the benefits of cesarean section to a large class of women who are relatively unfit for childbearing for various reasons, or in whom serious complications are present which are sure to give a certain proportion of bad results, no matter how they are cared for, has resulted in the wide adoption of cesarean section as an operation for the delivery of the unfit, and naturally surgery on the unfit carries with it a relatively high mortality.

Cesarean section is indicated, in the first place, in patients in whom some pelvic obstruction exists, which renders delivery per vaginam, even of a dead and mutilated child, either impossible or so dangerous that an abdominal delivery is attended by no greater risks for the mother than a pelvic delivery. This is admittedly the only absolute indication for the operation, and the operator who performs cesarean operations for other reasons must be sure that the benefits which are to be expected from the operation for either mother or child are sufficient to warrant a certain increase in the risk to the maternal life over what is to be expected following a pelvic delivery. The comparative safety of abdominal delivery in properly selected cases has led to its adoption in cases in which the delivery of a living child by the pelvic route is so open to question that it is considered proper to add somewhat to the maternal risk for the sake of guaranteeing the birth of a living child; but the operation is not a proper one when there seems to be a serious question that the preservation of the fetal life will be attended by a greatly increased maternal risk.

There is furthermore in all of our great centers of population a very considerable class of women for whom childbearing results in serious injury to health and sometimes in loss of life. Examination of these patients shows that there is no pelvic obstruction and, therefore, normal delivery is possible, but the results of pelvic delivery are such that the patient never entirely recovers from its effects and always remains more or less seriously invalided. Experience has shown that in many of these subnormal women delivery by cesarean section is a health saving, if not a life saving procedure, and although the results of major

surgery in women of this type will never be as good as is to be expected among women in good condition, none the less the health of many women will be preserved, leaving them useful citizens in the community, at the expense of a relatively slight increase in the immediate mortality of childbirth.

These three indications, the preservation of maternal life and health and of fetal life, constitute the only justifiable indications for the operation, but many operators perform cesarean section at the present time when by no possibility can either mother or child derive any benefit from the operation, the true indication being the inability of the attendant to select the proper method of treatment for the given patient, or his ignorance of the fact that cesarean section is not a panacea for all obstetric ills.

The great majority of cesarean sections are indicated when some disproportion exists between the size of the fetal head and the maternal pelvis, which either renders the birth of a living child impossible or so dangerous that abdominal delivery is the safer method for one or both patients. Statistics show that, of women with contracted pelves, eight out of ten can be delivered successfully, if allowed to go into labor and then delivered by a pelvic operation, and the figures on which this statement is based include the impossible as well as the doubtful pelves. It is, however, impossible to predict from the size of the pelvis alone whether labor will be possible or not, for of two women with identical pelvic measurements, one may have a spontaneous delivery, whereas the other may need a radical operation for delivery, even though the children may be of approximately the same size. Although the study of the pelvis does not give the absolute certainty to be wished for in regard to the outcome of labor, none the less the information to be obtained from pelvic mensuration is of sufficient value to warrant its performance on every patient, combined with a careful comparison of the child with the pelvic canal, the latter being of the utmost importance, since it must be remembered that disproportion between child and pelvis is more important than the size of either alone, and that pelvic measurements are of little value except in extreme cases, unless taken into consideration with the other factors involved in delivery.

Since, in the discussion of any problem, it is necessary to have a starting point, even though conclusions based on a single factor may have to be modified, it is customary to initiate the study of the indications for cesarean section by a consideration of the pelvis, for the reason that in most cases the size of the pelvic canal has a distinct bearing on the wisdom of allowing a patient to attempt labor.

Pelvic Contraction.—The most common indication for cesarean section is afforded by the existence of disproportion between the fetal head and the maternal pelvis to such a degree as to offer a serious mechanical obstacle to delivery. In the great majority of cases contraction or deformity of the pelvis is the principal factor in rendering labor unduly difficult, but it must be remembered that it is no more difficult for an undersized child to pass through a contracted pelvis than for an over large child to pass through a normal pelvis. Pelvic contraction, therefore, is not the only factor to be considered in estimating the probable course of labor, and the relation of the given child to the given pelvis must also enter into the calculation. The methods of determining

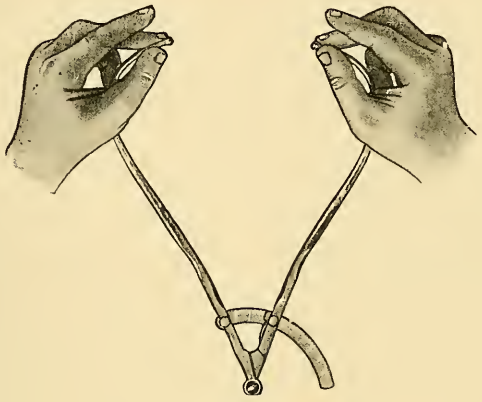


FIG. 1.—PELVIMETER.

the relation of the child's head to the pelvic canal will be discussed later.

The pelvic indication for cesarean section may be either absolute or relative.

(1) ABSOLUTE INDICATION.—It is universally agreed that whenever the true conjugate diameter measures 5 centimeters (two inches) or less, cesarean section is absolutely indicated to accomplish delivery, no matter what the condition of the patient may be, without regard to the length of time she may have been in labor or the possible presence of uterine infection. This is due to the fact that in such an extreme degree of pelvic contraction the delivery of a normally developed or even of a rather small child is practically impossible, even after embryotomy, and an abdominal delivery, therefore, offers the only chance of saving either the maternal or fetal life and is called for in all cases. This is practically the same indication that obtained in the early days of the operation, when the maternal mortality resulting from cesarean

section was so high that the prognosis of the operation was nearly hopeless.

(2) Relative Indication.—In a pelvis with a true conjugate diameter measuring between 5 and 7½ centimeters (two to three inches) the delivery of a living, average sized child is practically impossible, but it is usually possible to deliver a child on whom craniotomy has been performed, without undue risk to the mother, unless the child is over

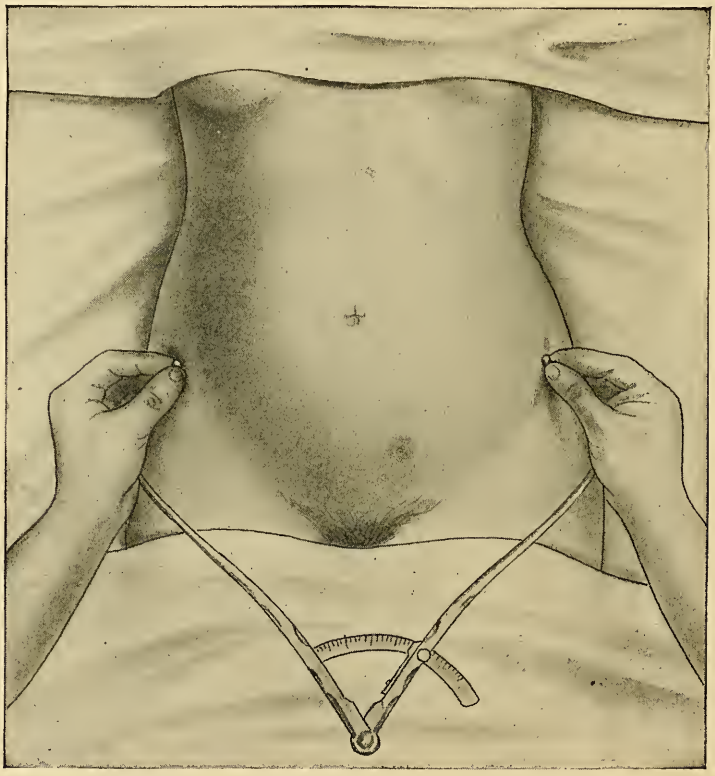


Fig. 2.—Measuring Distance Between Anterior Superior Spines.

large. Therefore, in patients in whom a pelvic contraction within these limits is recognized, as it should be when it exists, during pregnancy or early in labor, cesarean section at term is the elective method of delivery in all cases in which the child is alive and in good condition. If, however, at the time when the pelvic contraction is recognized the patient has been in labor a long time and is showing signs of exhaustion, or has by repeated manipulations been seriously exposed to infection, the prognosis of the conservative cesarean operation is sufficiently doubtful

to indicate either an extraperitoneal operation or cesarean section followed by supravaginal amputation of the uterus, according to the urgency of the symptoms and the judgment of the surgeon, hysterectomy being usually the preferable operation in cases of frank infection. If the child is dead, or in anything but good condition, craniotomy is the operation of election in cases of this type, since abdominal section on a patient late in labor and possibly infected is never justifiable, except in the inter-

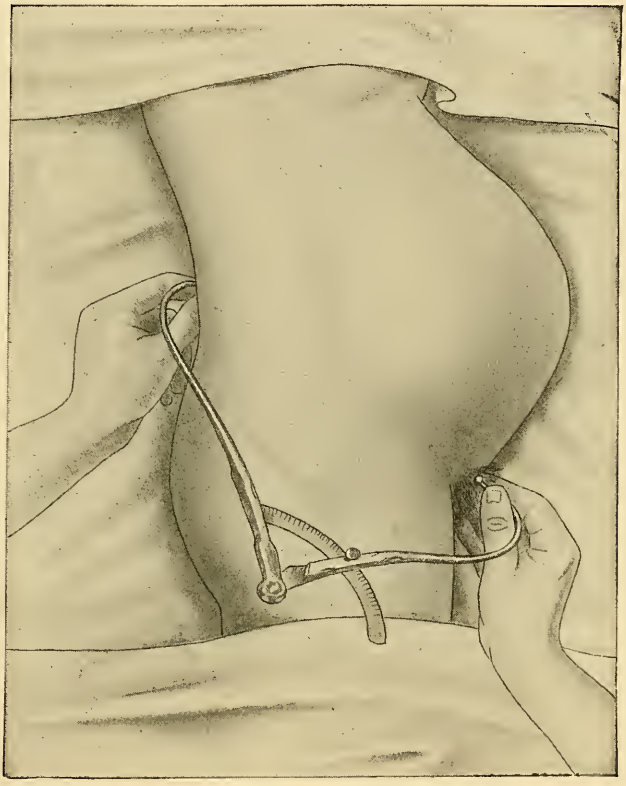


FIG. 3.—MEASURING EXTERNAL CONJUGATE DIAMETER.

ests of the child, when any other method of delivery is possible, and craniotomy should not be refused in such a case for purely esthetic reasons under conditions which render it the safest method of treatment for the mother. In other words, the interests of the child may occasionally afford sufficient indication to render a serious risk to the mother justifiable, but unless it seems practically certain that the life of the child can be guaranteed by running grave risks for the mother, her interests alone should be considered, unless, with a full understanding of the danger to herself, she insists that the child be given every chance.

Extension of Indications.—The excellent results of cesarean section at the time of election under modern conditions, and the fact that delivery of an average sized, full term child, except after craniotomy, is so difficult as to be practically as dangerous as cesarean section in a pelvis with a true conjugate diameter of less than 7.5 centimeters, have had a potent influence in modifying obstetric opinion in favor of more liberal views toward pelvic contraction as an indication for cesarean section, with the result that the upper limit of the absolute indication has been raised to 7.5 centimeters when the conditions which predispose to a

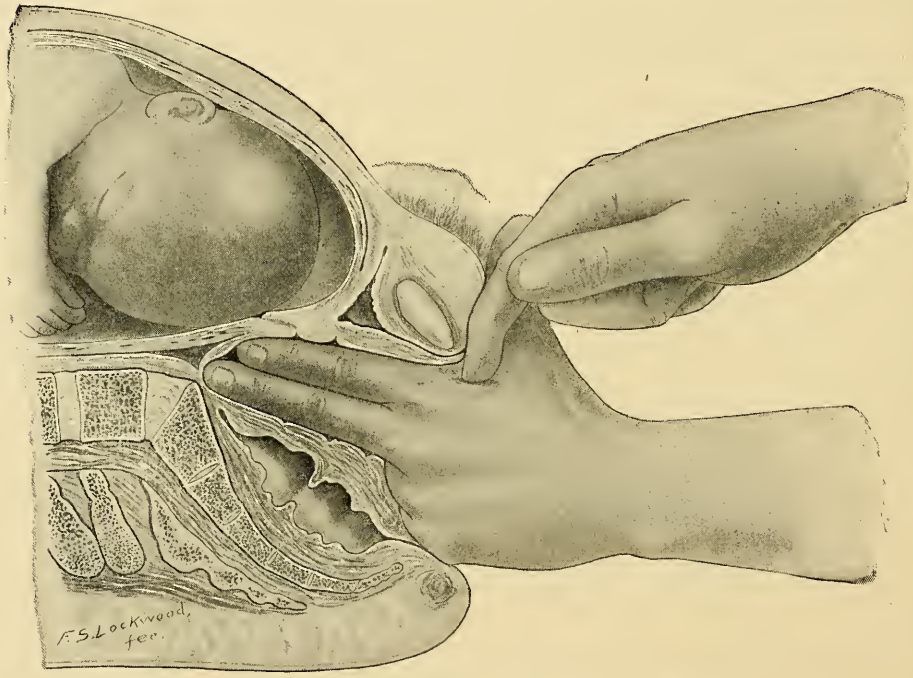


Fig 4.—Measuring Diagonal Conjugate Diameter.

successful result are fulfilled. These are: (1) The child must be alive and in good condition. (2) The patient must be in good condition and her chances must not have been compromised by the exhaustion of a long labor, by repeated vaginal examinations, or by previous attempts at pelvic delivery. In addition the membranes must not have been ruptured for more than a few hours. (3) The patient must be under proper conditions to warrant the performance of a major operation, i.e., either in a properly equipped hospital or in a home where hospital conditions can be reproduced. She must be able also to command the services of a properly equipped surgeon, and efficient after care must be provided for. If any of these conditions cannot be fulfilled, a pelvic operation

offers a so much better chance for the mother that it should be selected, even though it may involve the loss of the child.

In cases in which the degree of pelvic contraction is less marked, in which the true conjugate diameter measures between 7.5 and 8.5 centimeters in flat, and 7.5 and 9 centimeters in generally contracted pelves, the operation may be indicated as an elective procedure. In patients whose pelves offer this degree of contraction a satisfactory labor will often result in the delivery of a living child by means of a not too difficult pelvic operation, but it is exceedingly difficult to estimate the course of labor in advance, and many children are lost and mothers seriously injured as the result of attempting a pelvic delivery under such conditions.

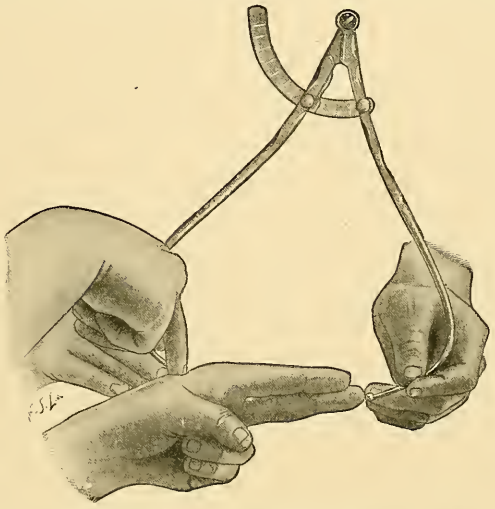
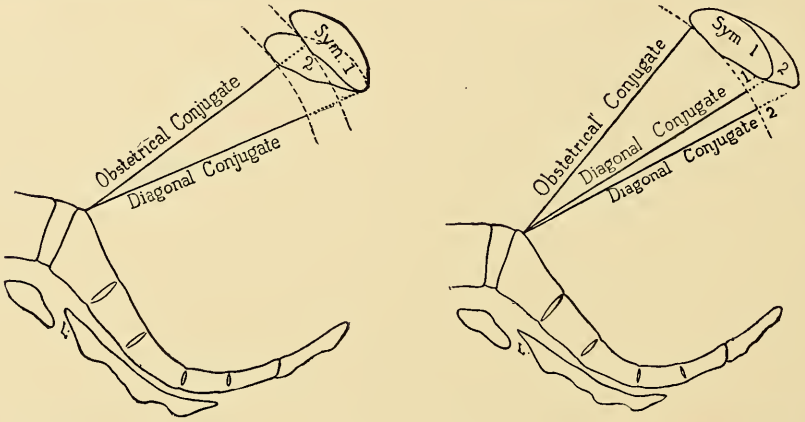


FIG. 5.—MEASURING DIAGONAL CONJUGATE DIAMETER ON THE FINGERS.

A large proportion of the patients in this class will either deliver themselves spontaneously or come to an operative, pelvic delivery of not undue difficulty, and the exercise of the wisest obstetric judgment is called for to determine which case can be safely delivered through the pelvis after a labor of not undue severity for the given patient, and which should be subjected to a radical operation for delivery. In this connection it must not be forgotten that the mere possibility of delivery through the pelvis is not the only factor to be considered, and that the effect of a severe labor on the after life of the given patient, with the chance of more or less serious laceration, must be taken into account. Two women with practically identical pelvic measurements and with children of approximately the same size may have totally different results. One may have a comparatively easy, spontaneous labor, while the other may require

a major operation to insure the safe delivery of a living child and the preservation of her own life or health. In the latter class of patients cesarean section is indicated, partly to save the mother from the almost inevitable damage attendant on a difficult version, high forceps, or craniotomy, and partly to guarantee the life of the child; but it is often impossible to predict with any degree of accuracy in the given patient what the character of her labor will be, and the comparison between the child and pelvis, though of prime importance, is not the only factor in the problem.

A thorough examination of the patient during the last weeks of pregnancy, preferably undertaken under full anesthesia, is obligatory in



FIGS. 6 AND 7.—VARIATION IN DIAGONAL CONJUGATE DIAMETER IN ACCORDANCE WITH HEIGHT AND INCLINATION OF SYMPHYSIS PUBIS.

these cases, together with a careful consideration of all the factors in the individual case. The pelvis should be carefully explored with the half hand, so that no pelvic deformity, which may not be indicated by the ordinary measurements, can be overlooked.

The attempt should be made to impress the head into the pelvis by Müller's method at the same time. If the lowest point of the head can be brought to the lower margin of the symphysis pubis, it can be regarded as practically certain that, if the patient has a labor of ordinary power, the head will be molded into the pelvis, sufficiently at least for the performance of a low or mid forceps delivery of not more than average difficulty, and cesarean section need not be considered unless other indications are present. If, however, the head cannot be fitted into the pelvic brim, and especially if it overrides the symphysis, the case is not so easily settled and other factors must be taken into consideration. If

the degree of overriding is marked, it is fair to assume that the head can only be molded into the brim, if at all, after a long and difficult labor, which will involve considerable danger to the child, and cesarean section at the time of election is the operation of choice for the sake of the child, provided proper facilities can be arranged for. This method of delivery will also save the mother from a severe labor, which may have

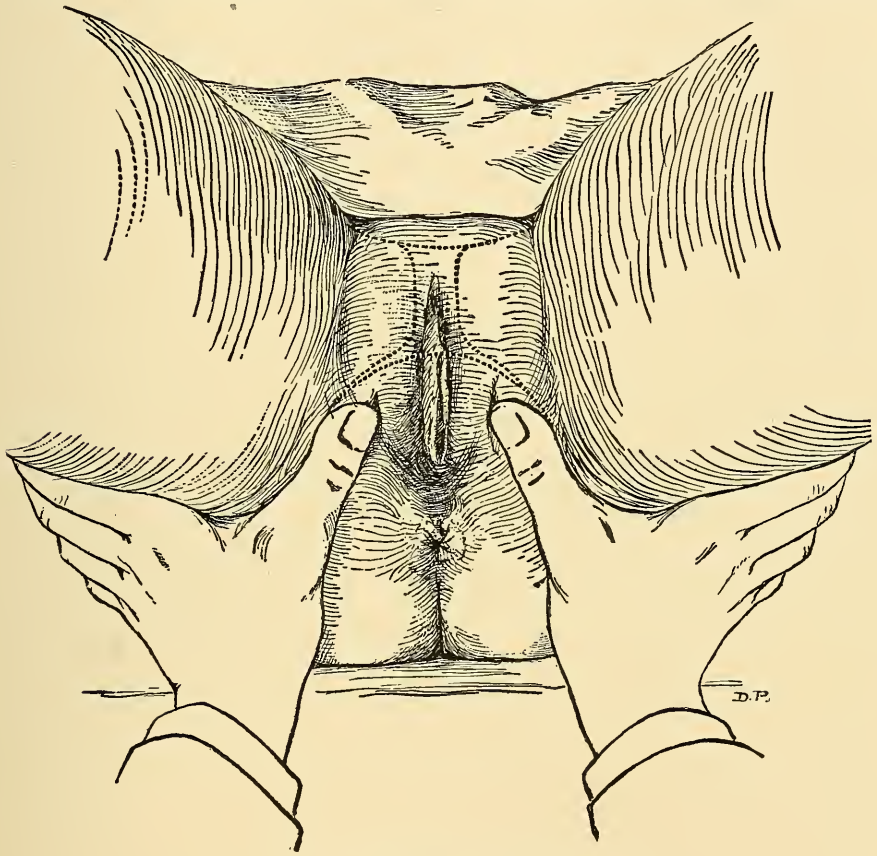


FIG. 8.—PALPATING PUBIC ARCH.

serious after effects on her general health, and unless her nervous and physical equipment is such that no unfortunate consequences need be feared, even though labor may prove to be unusually severe and prolonged, this fact should receive careful consideration.

In cases in which the overriding is slight, or in which no overriding is present, and yet the head cannot be fitted into the pelvis, other factors should be taken into consideration in deciding the problem.

If the patient is a primipara, of an age close to the end of the child-bearing period, an elective cesarean delivery offers an almost sure method

of securing a living child at a minimum of risk to the mother. The immediate risk of life to the mother is slightly greater in abdominal than in pelvic delivery in this type of case, but this is more than compensated for by the increased safety to the child, in addition to the avoidance of serious laceration, with its consequent possible invalidism and probable secondary operation.

If the patient is a multipara who has had previous obstetric disasters, cesarean section should be chosen without hesitation in these border line cases, unless the present child is manifestly smaller than the previous children have been, or the previous disasters can be traced to poor judg-

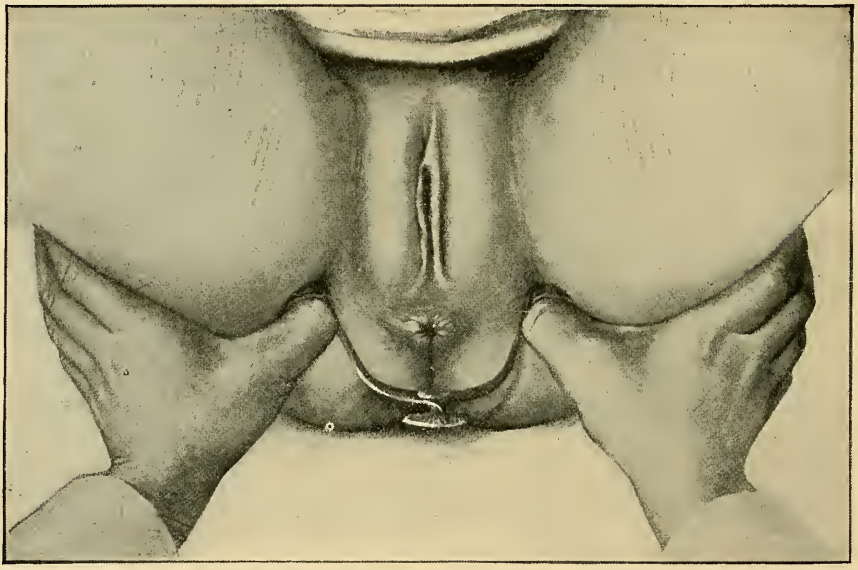


FIG. 9.—MEASURING TRANSVERSE DIAMETER AT OUTLET.

ment or operative technic on the part of the former attendant, and even then the obstetrician must be very sure of his superior ability as an operator before he decides to run the risk of losing another child for such a patient. Many children have been unwarrantably sacrificed, because the physician in charge of the second labor has assumed that his superior training warranted the assumption that he could succeed where his predecessor had failed, and he has thus been led into the error of not profiting by his patient's previous history and has sacrificed her interests to his own conceit. It is fair to say that, if a patient with a border line pelvis has lost one child as a result of a difficult operative delivery, cesarean section in succeeding pregnancies is advisable, and that, if she has lost more than one, the indication is absolute.

The examination should also include a careful estimation of the size of the child's head and comparison of it with the maternal pelvis by the various methods advised for measuring the fetal head, but these procedures, although of distinct value, do not give accurate information as to the outcome of labor, owing to the fact that other factors enter into the problem to a greater or less extent. It is undoubtedly the case

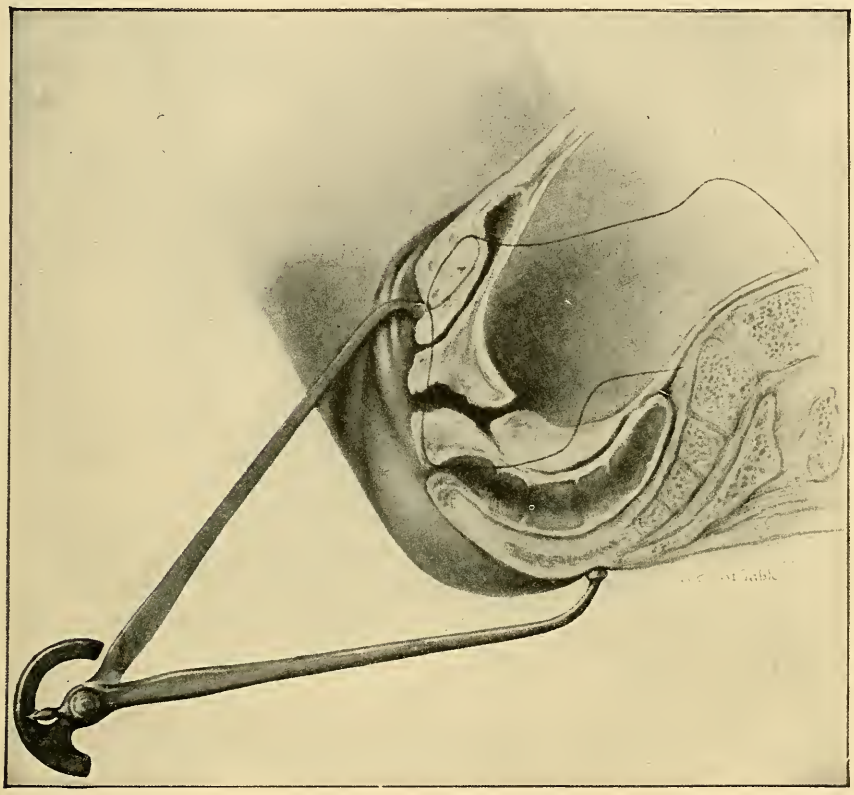


FIG. 10.—MEASUREMENT OF ANTEROPOSTERIOR DIAMETER AT OUTLET (WILLIAMS' METHOD).

that in expert hands such an examination will reduce the margin of error to a minimum, but the fact remains that the ultimate result in a certain number of cases depends on other factors which cannot be determined until the patient has been in labor for some time. The other factors which must be taken into consideration are: the probable character of the labor, i.e., the strength and frequency of the uterine contractions, the time at which the membranes rupture, whether before or after dilatation of the cervix has been attained; the rigidity of the soft parts, and the molding power of the child's head. In addition, the effect of a hard

labor on the individual patient must be taken into consideration in determining the best method of delivery, since in women who are below the normal standard, either physically or nervously, the exhaustion of a prolonged and severe labor may leave permanent after effects of a more or less serious character, and furthermore, the results of severe laceration may have a very detrimental influence on a patient's after health.

(1) *Probable Character of the Labor.*—In a primipara the character of the labor cannot be surely predicted. As a rule strong, well developed women will have good labors, while frail, anemic women are more likely to have unsatisfactory labors. This rule, however, is by no means absolute, and flabby, anemic women may have satisfactory labors, the uterus developing unlooked for power and the resistance of the soft parts being reduced to a minimum, while in some strong, healthy women the uterine action proves feeble and unsatisfactory from the start.

The nature of the pelvic contraction may, in some cases, give a clue to the probable character of the labor. In patients with rachitic pelves labor is apt to be powerful and satisfactory in character and the same holds true in women with flat pelves, the pelvic contraction being a purely local condition without associated change in the uterine musculature, the latter being normal and capable of developing the necessary power.

In women with generally contracted pelves, due to a lack of proper development, the pelvic organs are also apt to be underdeveloped, and labor will often prove ineffective, owing to a lack of proper muscular development of the uterus, with the result that even a slight pelvic disproportion may afford too great an obstacle to be overcome by the feeble uterine forces.

In other cases, with an apparently normal pelvis, the uterine development may be deficient, as is evidenced by a history of irregular and painful menstruation, suggesting an infantile condition of the uterus. These symptoms are, however, only suggestive and do not afford definite evidence of muscular inefficiency of the uterus; but they deserve some consideration when the adaptation between the head and pelvis is abnormal, and in doubtful cases may very properly be the deciding factor in the selection of the method of delivery most appropriate to the given patient's needs, and result in the choice of cesarean section at the time of election as the wisest method of delivery in the given case, although in doubtful cases a few hours' trial of labor may be given in order to decide the question.

(2) *Dilatability of the Cervix.*—The dilatation of the cervix to the point at which it no longer offers an obstacle to the birth of the child is a sine qua non of successful pelvic delivery. Under normal circum-

stances this is accomplished by the hydrostatic action of the "bag of waters" and in cases of the early rupture of the membranes by the presenting part. As a general rule dilatation is materially delayed by the premature rupture of the membranes, even when the head is well in the pelvis, although in these cases the delay is usually relatively unimportant.

When disproportion exists, however, between the fetal head and the maternal pelvis, early rupture of the membranes assumes a much greater significance. The natural dilator of the cervix is lost, and the presenting part cannot act as a dilator until after the formation of a considerable caput succedaneum, owing to the fact that it cannot come into contact with the cervix until it is molded into the pelvis, which as a rule does not occur, at least completely, until dilatation of the cervix is accomplished. Since the molding of the head is usually accomplished during the second stage of labor, the head is not in the pelvis and thus in contact with the cervix in cases of even moderate disproportion, and progress ceases until the edematous caput is formed to act as a dilator. This loss of time frequently results in such a degree of exhaustion of the mother as to call for prompt operative interference before dilatation of the cervix is accomplished, or the lower uterine segment may become dangerously overdistended, with consequent danger of rupture before proper dilatation of the cervix is accomplished. Early rupture of the membranes should, therefore, be considered as a very definite indication in favor of cesarean section in cases where the method of delivery is doubtful, as in cases in the border line class, and even in cases in which little doubt is felt as to the probability of pelvic delivery, if labor is satisfactory; since the progress of labor is apt to be so seriously interfered with that the cervix may fail of satisfactory dilatation before exhaustion of either the patient or the uterus develops, and the dangers of an operative pelvic delivery greatly increased.

Careful observation of the progress of the case by rectal examination will furnish the best evidence as to what the treatment should be, and if progress is not steady and satisfactory in these cases prompt abdominal delivery is called for. Repeated vaginal examinations to determine progress, though somewhat more satisfactory in some cases than rectal examination, add to the danger of infection to such an extent that in cases in which abdominal delivery is a possibility vaginal examination should be dispensed with whenever possible.

Unsatisfactory dilatation of the cervix and persistently inefficient, irregular uterine contractions should be considered as an indication for cesarean section, even in cases with unruptured membranes, when any

serious doubt exists as to the ability of the head to pass through the pelvic cavity unless markedly molded. Under these circumstances it is extremely doubtful if labor will prove satisfactory at any time, and a delay of any considerable length means either a difficult pelvic operation with considerable danger to both patients, or a late cesarean section with a definite increase in the risk to the mother. There is no advantage to be gained by a long delay in a case of this nature, since four or five hours of labor will furnish an almost certain clue to the ultimate character of labor, and if the uterus fails to function properly within a reasonable time, it is almost sure that labor will not prove efficient in overcoming a serious mechanical obstacle. Cesarean section is, therefore, indicated as soon as the inefficiency of the labor is demonstrated.

In these border line cases the outcome is to a certain extent doubtful, even if labor is satisfactory in character in the beginning, and any departure from the normal should be met by a prompt change in policy, unless the delay already permitted is felt to have seriously increased the risk of abdominal delivery, or unless vaginal examination has been freely practised in the attempt to study progress.

(3) *The Molding Power of the Fetal Head.*—The question as to whether a given fetal head can pass through a given pelvis can in some cases only be answered by a knowledge of the degree of molding which a given head will undergo when subjected to the forces of labor. Unfortunately we cannot predict for the given case, if the patient is a primipara, but must wait for sufficient dilatation of the cervix to permit of palpation of the head before arriving at a decision. In a multipara some information may be gained from the history of previous labors. If the previous children have had large heads with small fontanelles and narrow sutures it is probable that this child will have a similar head and the molding process be slow and difficult, even if it be possible; and unless the first stage of labor is promptly completed, so that the whole power of the unexhausted uterus can be exerted to accomplish molding of the head, the waiting policy should be abandoned and cesarean section performed.

The question can only be definitely answered by palpation of the fetal head through the partly dilated cervix, which means a delay of several hours at the best. If on examination through the partly dilated os it appears that the head is poorly ossified and the sutures and fontanelles are widely open, and the bones of the skull are parchment like to the touch, a marked degree of molding is possible and delivery may be accomplished from below by a not too difficult operation, after it has taken place, if the uterine contractions are of average strength. On the other

hand, if the sutures and fontanelles are nearly closed and the bones are firm and hard, molding is sure to be a long and difficult process and the powers of the patient may fail before it is accomplished to a satisfactory degree, even though the uterine contractions may be of unusual strength. In these cases the proper treatment must depend on the estimation of the patient's ability to undergo a severe labor without serious after effects and on the estimated degree of the force exerted by the uterus. If any real doubt exists in a case of this nature, cesarean section is the operation of choice, and the operation should be undertaken as soon as any real doubt as to the probable outcome arises, since if interference is delayed until failure is absolutely demonstrated, the prognosis of the operation will be seriously changed for the worse for both mother and child.

In the majority of border line cases a few hours' trial of labor will give a strong hint as to the probable outcome, and if labor is conducted aseptically and the progress of the case followed by abdominal palpation and rectal examination, the risk to the mother will be only slightly increased over that of operation at the time of election, i.e., before labor begins, or in the early hours of labor. In fact a certain advantage may be gained by the fact that a moderate amount of cervical dilatation will occur, which theoretically will provide for more satisfactory drainage later and may obviate the necessity for dilatation of the cervix during the convalescence in case a tendency to retention of lochia occurs, although in my experience this is a theoretical advantage only.

Of course the result of labor cannot be accurately predicted in a certain proportion of cases until the patient has had a true test of labor, i.e., two hours or more in the second stage, but a few hours of labor will determine whether the case is likely to progress to a favorable conclusion, except in so far as the ultimate molding of the head is concerned.

If the progress of labor is anything but perfectly satisfactory, cesarean section at once becomes the indicated procedure, provided the patient has not been compromised by repeated vaginal examinations.

If the progress is satisfactory and the cervix is dilating properly, so that it is evident that the head will be subjected to the molding power of the uterus before the patient is exhausted, labor should be permitted to proceed on the understanding that cesarean section will be considered as contraindicated after a thorough test of labor, except in the rare case when, the test of labor having failed to mold the head into the pelvis, some unusual factor calls for the delivery of a living child, even at considerable risk to the mother. Such a condition should be recognized,

however, before labor begins and should call for a primary cesarean section, since whenever the life of the child assumes an unduly great importance, the risks involved in applying a test of labor should not be taken whenever any reasonable doubt exists as to the probable outcome, inasmuch as an elective operation will give better results for both mother and child than a late section or a difficult pelvic delivery.

(4) *Effect of Labor on the Patient.*—In considering the best method of delivery for patients with a moderate pelvic contraction, the effect of a long, hard labor on the patient should be carefully considered. There exist in every large city many women who are physically or nervously poorly equipped and who will suffer more or less seriously if they are subjected to a serious strain, and may possibly never fully recover. The frail, anemic woman, who has normally just enough strength for the ordinary burdens of life, is usually a poor risk to be subjected to a severe physical strain and may suffer seriously, if not permanently, from the effects of a hard labor. One not infrequently sees patients who have not recovered from the strain of a normal labor for many months, even though the strain was not an unduly severe one. To subject such a patient to a labor which would tax the powers of the strongest woman may mean a long period of invalidism, which could be avoided very properly by an abdominal delivery, since it is a fact that many frail women stand an operation well and show very slight after effects, but recuperate very slowly and imperfectly from a severe exhaustion, such as is necessitated by a labor of no more than average severity.

An unstable nervous equilibrium may also furnish a perfectly good indication in these cases. Many women expend their whole nervous energy in the routine of their daily lives and are unfitted to bear any additional strain. Such women not infrequently suffer so severely from the nervous exhaustion incident to a normal labor as to be invalided more or less seriously for a considerable time, and may never entirely recover from the effects of childbirth, even though no physical lesion can be determined; and many cases of more or less severe nervous breakdown follow labor in patients who have no reserve of nerve force and who are living up to their limits in their daily lives.

If a patient's previous history indicates that her nervous stamina is below par and that any added burden in her ordinary life has been followed by a nervous breakdown, cesarean section should be carefully considered as a conservative procedure, even in patients with normal pelves, unless careful examination shows that owing to the relaxed condition of the soft parts the labor is sure to be an easy one. If a patient of this sort has any pelvic contraction, even of moderate degree, the

method of delivery which adds least to the burdens the patient is staggering under should be chosen, in order to diminish the strain as far as possible. The easiest method for such a patient is undoubtedly cesarean section, and my experience has shown that the results of the operation in patients of this class are much better than those seen after a hard labor, and that a very slight increase in risk is involved.

The pain of labor per se, without taking into consideration the severe muscular exertion, seems to be too much of a burden for many women of this class, and not infrequently creates a permanent impression on the patient, so that the rest of her life is spent in fear of a repetition of the horrors she remembers, a condition which might have been avoided if her needs had been recognized and the strain of labor avoided.

Another type of patients in whom the exhaustion of a severe labor may develop permanent after effects is the class who do not improve in general condition during pregnancy and who come to labor in a poorer general condition than existed before the beginning of pregnancy. The average woman improves markedly in general health during pregnancy, and the patient who does not so improve should cause her attendant serious anxiety as labor approaches. Examination may show nothing to account for the lowered vitality, but the condition is not a normal one. I believe that many of these patients are suffering from a low grade toxemia as a result of which they become unfitted to bear the strain of a severe labor, and if the degree of pelvic contraction is anything but slight, cesarean section offers the best method of delivery.

Cardiac Conditions.—Patients who show definite heart lesions are seldom, if ever, good risks for any but the easiest of labors, even though no pelvic abnormality exists, particularly patients with mitral stenosis or aortic regurgitation, and the indication is emphasized if there have been attacks of decompensation during or before pregnancy. Cesarean section is always indicated in cardiac cases when any reason exists to expect a difficult labor. This is particularly true on account of the danger of cardiac failure occurring during or shortly after a labor of not more than average severity. The lives of many women have been sacrificed, and many others have been left as cardiac invalids, owing to the mistaken idea that a heart already damaged can be with safety allowed to undergo the severe strain of a labor which may test the reserve of even a normal heart to the utmost.

Another group of patients who should not be subjected to any but the easiest of labors comprises those who, though the heart shows no definite lesion on examination, yet develop dyspnea and tachycardia on the slightest exertion during pregnancy. With them should be included

the patients who are suffering from a presumable myocarditis following acute infection, patients who after a reasonable interval of normal health would probably make a complete recovery, but whose convalescence is retarded by the burden which pregnancy throws on the weakened heart muscle and who show minor cardiac symptoms throughout pregnancy. Such patients are poor risks to be subjected to any avoidable strain, since the heart muscle is flabby and the strain of even an easy labor may result in acute cardiac dilatation, which may prove alarming and possibly fatal. Furthermore the strain thrown on the heart by labor may retard, if not prevent, complete restoration of the heart to a normal condition. In multiparae with relaxed soft parts a short first stage will do little if any harm, but the second stage of labor should be curtailed by operative means. In primiparae with such a cardiac condition labor should be avoided and the patient delivered by cesarean section, even though the pelvis is normal and there is no reason to expect any greater strain on the heart than is inevitable in a normal labor. If any disproportion exists between the child and the pelvis, as in border line cases, the indication for cesarean section becomes an absolute one, since the strain of a labor which will probably be of more than average severity is sure to produce harmful effects on such a heart muscle, and may result in chronic invalidism, if not in death during labor. Acute dilatation of the heart with its attendant dangers will develop in a certain proportion of these cases, if they are subjected to labor, and in others the return of the heart to a normal condition will be retarded, while in some permanent damage will result from the strain, and the heart will never become perfectly normal. Cesarean section is, of course, not without some risk in these patients, but the risk will be only slightly greater than in normal women, unless the heart is showing signs of decompensation at the time of operation. Even then both the immediate and ultimate results will be better than if the patient is allowed to undergo the strain of labor, or is subjected to a difficult operative delivery per vaginam. In these cases cesarean section is the operation of election, not because it can be guaranteed to give perfect results, but because labor followed by an operative delivery is exceedingly dangerous for these patients and cesarean section is the lesser evil.

Pelves with a True Conjugate of More than Nine Centimeters.—In pelves with only a moderate degree of contraction of the true conjugate diameter cesarean section will comparatively seldom be the operation of election, unless the child is over developed or some other indication than the pelvic one exists.

In a primipara with such a pelvis the attention of the attendant

should be called to the existence of the contraction by the fact that the fetal head does not descend into the pelvic canal in the latter part of pregnancy, rather than by the pelvic measurements. The non-engagement of the fetal head per se should call for a thorough pelvic investigation, preferably under anesthesia, when the extent of the pelvic contraction would be ascertained. If the true conjugate is more than nine centimeters and the child is of no more than average size, radical operation will seldom be called for, although the course of labor should be carefully observed from the beginning and any departures from the normal should be promptly investigated and receive proper treatment. If, however, labor is normal from the beginning, a pelvic delivery is almost certain after a labor of little more than average severity.

If, however, the child is above the average size, cesarean section will often prove the operation of election, since the important factor is the comparison between the child and the pelvis and not the size of either by itself. In doubtful cases a test of labor (as described in the preceding section) should be carried out under full aseptic precautions and the ultimate treatment of the case decided by this test.

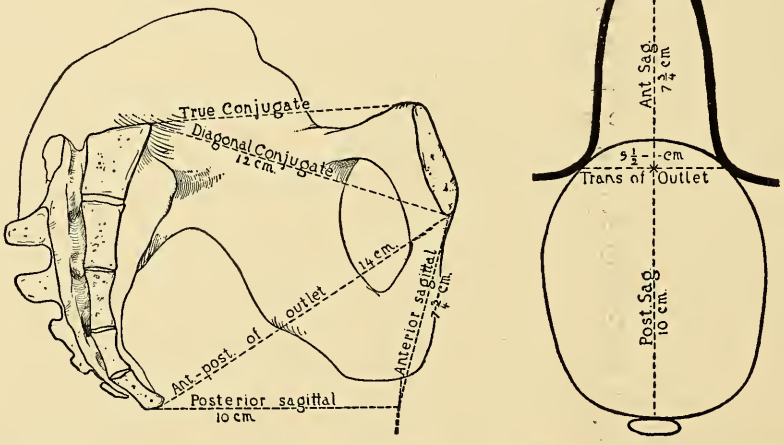
In multiparae the history of previous labors, plus the size of the present child, should be the determining factor in the choice of treatment. Women who have lost a child in a previous labor should be delivered by cesarean section, unless the present child is manifestly, distinctly smaller than the previous one, whereas women who have been successfully delivered in previous labors, unless by unduly difficult operations or at the expense of serious injury to the soft parts, should be allowed to go into labor without fear, unless the present child is distinctly larger than the previous children, in which case cesarean section may very properly be indicated.

The presence of any complicating factor, such as cardiac disease, subnormal equipment, etc., will very properly call for a change of policy in regard to patients with a slight degree of pelvic contraction, and cesarean section may be indicated on account of the complicating condition, but the pelvis per se, in cases in this class, will seldom necessitate the operation.

Malpresentations, or malpositions, of the child should have some influence in determining the course of treatment in doubtful cases. It is well recognized that transverse and face presentations occurring in primiparae furnish definite evidence of disproportion between the fetal head and the pelvis. The discovery of such an abnormality in a patient whose pelvis has already been recognized as somewhat contracted may well prove a sufficient indication for cesarean section, since in these

cases a more or less difficult operation is almost surely necessary to effect delivery, and the danger to the child is great, inasmuch as, owing to the malposition, the head will probably be dragged through the pelvis in an unmolded condition, which will add greatly to the danger to the fetal life and the maternal tissues. In multiparae the occurrence of malpositions is less significant, since the soft parts of the mother will offer little resistance to delivery, and the only problem to be determined is the relation of the fetal head to the pelvis.

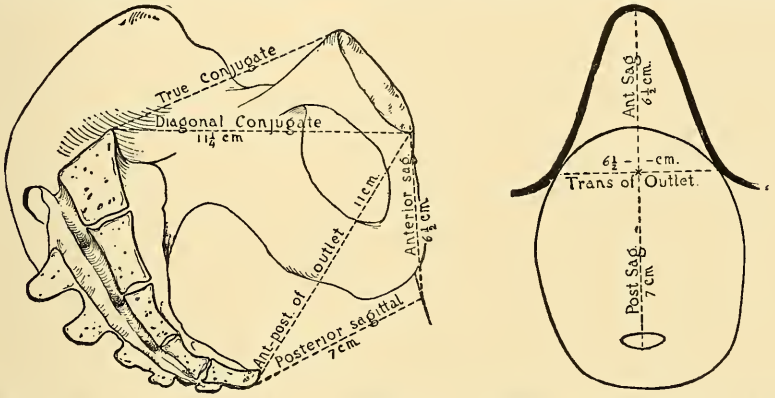
Contraction of the Pelvic Outlet.—As a rule, in considering pelvic contraction as an indication for cesarean section, attention is directed to the pelvic brim and the outlet receives little or no consideration.



FIGS. 11 AND 12.—IMPORTANCE OF ANTERIOR AND POSTERIOR SAGITTAL DIAMETERS: SPONTANEOUS DELIVERY.

Williams has shown that contraction of the outlet of the pelvis is probably the most common form of contraction met with among white women in this country, and the outlet should therefore always be measured as a routine in studying the pelvis. It is commonly stated that a transverse diameter of 7 centimeters or less is a positive indication for an abdominal delivery. Unfortunately the question cannot be settled as easily as this and further study of this type of pelvic contraction is necessary. As Klien has pointed out, the length of the transverse diameter, neither by itself nor in combination with the anteroposterior diameter of the outlet, furnishes sufficient information for the adoption of a settled policy. Serious dystocia may result in cases in which the degree of contraction is only moderate, and spontaneous delivery may sometimes occur in patients who present extreme degrees of contraction.

This apparent discrepancy is readily explained, however. It is evident that the shortening of the bisischial diameter is associated with a narrowing of the pubic arch and an approach to the male type of pelvis. As the arch becomes narrowed a smaller segment of the head can pass beneath it, and in the most marked cases the only portion of the pelvic outlet that the head can enter is posterior to the bisischial diameter. In such cases it is evident that delivery will be impossible unless the posterior portion of the outlet is sufficiently enlarged to permit the passage of the head, and that the important diameter is the distance between a line joining the ischial tuberosities and the tip of the sacrum, and not the anteroposterior diameter of the outlet as a whole. This diameter is known as the posterior sagittal diameter of the outlet and can be readily measured by the use of one of the specially devised pelvimeters.



FIGS. 13 AND 14.—IMPORTANCE OF ANTERIOR AND POSTERIOR SAGITTAL DIAMETERS: CESAREAN SECTION.

For spontaneous delivery to occur, it is evident that the posterior sagittal diameter must increase in length in proportion to the shortening of the bisischial, and it is possible to calculate with fair accuracy the amount of increase necessary to render delivery through the pelvis probable.

Williams gives the following figures, which may be accepted as being as accurate as pelvic measurements by themselves can ever be in formulating a prognosis, and which show approximately the increase in the posterior sagittal diameter necessary to permit the average fetal head to pass the outlet in cases of marked contraction of the transverse diameter:

Transverse	diameter	8	cm.;	posterior	sagittal	7.5	cm.
"	"	7	"	"	"	8	"
"	"	6.5	"	"	"	8.5	"
"	"	6	"	"	"	9	"
"	"	5.5	"	"	"	10	"

At the best, however, the pelvic measurements are only one of the factors involved in the question, and it is a not uncommon occurrence for patients with relatively normal measurements to develop serious dystocia, and on the other hand for patients with extremely doubtful measurements to have a spontaneous labor. It is necessary also for other factors to be taken into consideration before deciding on the treatment of the individual patient.

The size of the child must be taken into account, since the measurements given are considered in relation to a child of average size and not to one which is overdeveloped, proper molding of the head being often as necessary for successful passage of the outlet as it is for entrance into the brim. Over large children are apt to have large and well ossified

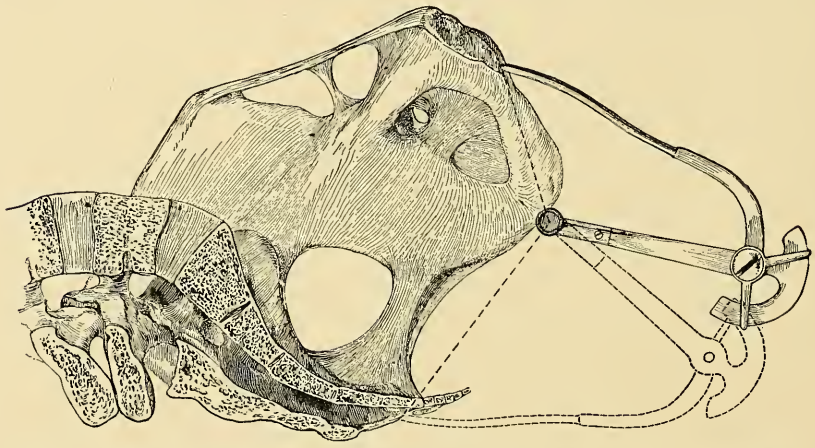


FIG. 15.—MEASUREMENT OF ANTERIOR AND POSTERIOR SAGITTAL DIAMETERS WITH THOMS' PELVIMETER.

heads, and since, in cases of funnel pelvis, the head is already in the cavity of the pelvis and its size can only be estimated with difficulty, the size of the child as a whole must be taken as a guide to the size of the head.

The depth to which the head enters the pelvis before meeting obstruction furnishes a certain amount of information. If the head remains above the ischial spines and cannot be forced lower, even under anesthesia, the ability of the head to mold through the outlet is at least open to question in marked cases of funnel pelvis. If, however, it is possible to push the head well down onto the pelvic floor before labor is far advanced, it will almost certainly come through the outlet without great difficulty, even in cases of fairly marked contraction.

The position of the fetal head is also of some importance. In cases of posterior position of the occiput the normal rotation to the arch is

apt to be interfered with, and the head not infrequently becomes impacted while still posterior, to such a degree that rotation to the arch, even by means of the Scanzoni maneuver, becomes a matter of considerable difficulty, with a definite increase in danger to the child; then if rotation fails extraction of the child may be impossible or necessitate the use of such force as to cause its death. In such cases a resort to pubiotomy will solve the problem with least danger to mother and child, unless infection has already occurred, but if the operator is not equipped to perform this operation the only alternatives are cesarean section, a brutal forceps extraction, or craniotomy.

Owing to the fact that the anterior portion of the pelvic outlet is not available for the passage of the head, the perineum is subjected to much greater distention than in normal cases and serious lacerations may result. It is evident that a considerable proportion of complete perineal lacerations are inevitable in cases of marked outlet contraction, on account of the backward displacement of the head, if a pelvic delivery is undertaken. This fact should be given some weight in patients who bear pain and discomfort badly, and a cesarean section may very properly be considered in certain cases in which the markedly contracted outlet renders the liability to serious laceration a factor in the case, especially in elderly primiparae, since the patient may well be better off after a cesarean section than after a complete laceration which does not heal properly and requires secondary operation for its relief.

After Operations for Pelvic Repair.—Multiparae, with marked contraction of the outlet, who give a history of difficult delivery at previous labors, even though the children may have lived, and who have suffered from serious lacerations which have been successfully repaired, present a definite indication for cesarean section. This is the case because a more or less forcible operation will be necessary to effect delivery, and, owing to the fact that the cicatricial tissue left after the operation for repair will probably not stretch sufficiently to permit delivery, a severe, if not complete, laceration is almost inevitable. This laceration being largely through scar tissue, the vitality of which is low, will in all probability heal only partially when sutured and require a secondary operation for relief. Furthermore, the increasing size of children in successive pregnancies tends to render each succeeding delivery more difficult, and, therefore, more dangerous to the child as well as to the maternal tissues. For these reasons it is clear that, from the standpoint of both mother and child, certain very definite advantages appertain to cesarean section as an elective procedure in such cases, even though a pelvic delivery may be possible, and the avoidance of invalidism and

secondary operation will often indicate cesarean section as the operation of election.

Elderly Primiparae with Funnel Pelves.—In elderly primiparae who show contraction of the pelvic outlet of even a moderate degree cesarean section is distinctly the operation of election for two reasons: in the first place, all danger to the child should be avoided, unless it involves too great an increase in the risk to the mother, since it is very possible that there may never be another pregnancy in women of forty or over, and no serious risk of losing the child during pelvic delivery is justifiable when its life can be practically guaranteed by abdominal delivery. Furthermore, in this class of patient the soft parts are more apt to be rigid than in younger women and, therefore, are more liable to extensive laceration with its consequent disability. I believe that the majority of primiparae over forty years of age are best delivered by cesarean section at the time of election, both to avoid the possible loss of the child, and severe laceration, which is often inevitable if pelvic delivery is attempted, even though the pelvis may be normal; and if the patient shows even moderate contraction of the outlet abdominal delivery is, in my opinion, even more distinctly indicated.

Young Primiparae with Funnel Pelves.—In young primiparae with funnel pelves the question is an open one. The performance of cesarean section on young women is liable to mean repeated operations, until finally the patient is sterilized to avoid their necessity. Some authorities, therefore, recommend a primary pubiotomy in these cases, in the hope that not only will the present child be successfully delivered, but that as a result of the operation the pelvis will be sufficiently enlarged to permit of the occurrence of spontaneous labor in subsequent pregnancies. My own personal preference is for cesarean section in this type of patient, but the excellent results which some writers report after primary pubiotomy must be taken into consideration before definitely dismissing the question as settled. Other writers do not seem to have been fortunate in securing permanent enlargement of the pelvis after pubiotomy, though the operation otherwise proved successful, and in the absence of a definite agreement as to the results to be expected in pubiotomy, both as regards the future of the patient from a childbearing standpoint, as well as the immediate risk to life, the wiser course is cesarean section in doubtful cases. By this means the life of the child can be practically guaranteed, and the mother will be restored promptly to perfect health. The danger to the maternal life in cesarean section in good hands, in a proper hospital, and when performed on a patient in good general condition, should not be any greater than, if as great as, that attending pubiotomy, if one

can judge by the general statistics, although such a series of cases as published by Williams would lead one to suppose that pubiotomy is not attended by risk to life. Other operators, however, have not had as good results, and there would seem to be a definite, though small, mortality attendant on pubiotomy, practically as great as that attending the primary cesarean section. Furthermore, pubiotomy undoubtedly has, in the hands of the average operator, a higher morbidity and is more likely to leave more serious disability, than cesarean section at the time of election. It is probable, however, that pubiotomy has a distinct place in patients seen late in labor, since in these cases the results of cesarean section are relatively unsatisfactory, even though no definite symptoms of infection are present.

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CHAPTER III

OTHER PELVIC INDICATIONS

Kyphotic Pelvis—Spondylolisthetic Pelvis—Coxalgic Pelvis—Obliquely Contracted Pelvis—Transversely Contracted Pelvis—Osteomalacic Pelvis—Pelvic Exostoses—Tumors of Pelvis—Old Pelvic Fractures—Bibliography.

No discussion of the pelvis in relation to the necessity for cesarean section would be complete without including the more uncommon pelvic deformities, due to abnormalities outside the pelvis, or to abnormalities of development. The forms of pelvic contraction which have been under discussion in the previous sections have been due to some developmental fault in the pelvis as a whole, possibly complicated by rachitis in early life, or in other cases due to a simple lack of development, or to weight bearing at a period of life when the bones of the pelvis were still soft and malleable.

Other forms of deformed pelvis remain for consideration in which the pelvic changes, due to abnormalities in the development of certain of the pelvic bones, are responsible for the deformity; or else it is produced by disease in other portions of the skeleton, as for instance in the spinal column or hip joint, which brings about changes in the pelvis owing to a faulty transmission of the body weight. The majority of patients who show these deformities have some peculiarity of figure or of gait, which should attract the attention of the most careless observer, and thus serve as an indication for careful examination to estimate their importance, although only too often no attention is paid to them.

Kyphotic Pelvis.—The changes in the pelvis which result from spinal caries vary according to the level at which the spine is affected. If the deformity is in the dorsal region, it is compensated for by a marked lordosis below it, and the pelvis is little changed. When the kyphos is in the lumbar region, the attempt at compensation produces marked changes in the pelvis, which are increased in degree, the lower the process. The main characteristic of the pelvis in these cases is a marked funnel shape, the iliac crests being flared out and the ischial spines and tuberosities approaching each other. The effect on labor is even more pronounced than in the ordinary form of funnel pelvis, since the sacrum is

rotated to some extent on its transverse axis and the tip approaches the symphysis. The posterior sagittal diameter of the outlet is thus shortened, and a contraction of the bisischial diameter to less than 8 centimeters in these cases is an absolute indication for a radical operative delivery, preferably cesarean section, if the child is living and the patient otherwise a good operative risk, since the anteroposterior contraction of the outlet renders the chance of spontaneous delivery in these cases practically nil, and the ordinary operative procedures usually result in death of the child and greatly increased risk to the mother. Pubiotomy may be con-

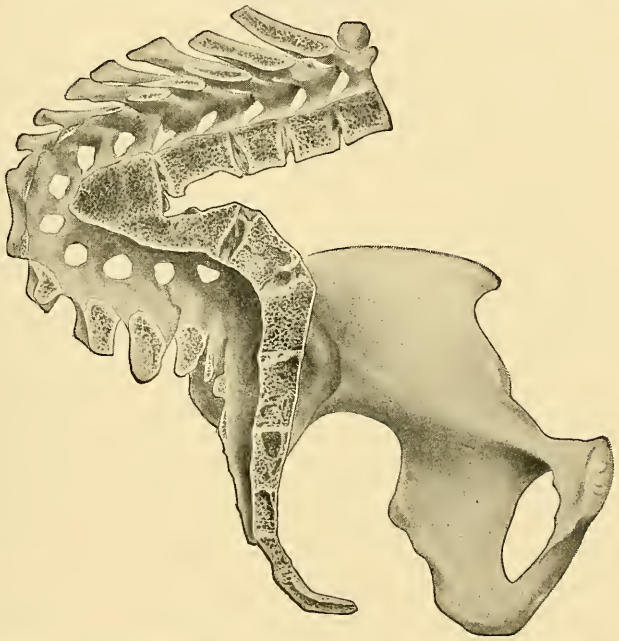

FIG. 16.—DORSOLUMBAR KYPHOSIS: LONGITUDINAL SECTION.

sidered, if the transverse diameter is not less than 6 centimeters and the patient is a doubtful cesarean risk, owing to the length of time she has been in labor or for some similar reason. If the child is dead, craniotomy is the operation of choice, and if the patient is believed to be infected, cesarean section followed by hysterectomy will give the best results.

When the lumbosacral junction is the site of the disease, the lumbar vertebrae may collapse forward and completely block the pelvic inlet, making the entrance of the presenting part into the pelvis practically impossible.

The results of labor in kyphotic pelves have proved very unsatisfactory. The fetal mortality is given as between 40 and 50 per cent and the maternal prognosis varies with the degree of contraction, being in one

series of cases 24.3 per cent. Cesarean section at the time of election is the indicated treatment in all cases where the pelvic contraction is at all marked, and I believe it to be the elective procedure in all cases in which any reasonable doubt exists as to the possibility of a pelvic delivery.

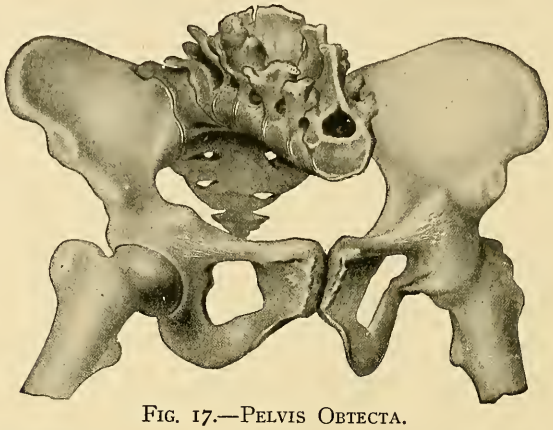

FIG. 17.—PELVIS OBTECTA.

Spondylolisthetic Pelvis.—This rare deformity has a very serious effect on labor, if it is at all marked. In slight cases it modifies the course

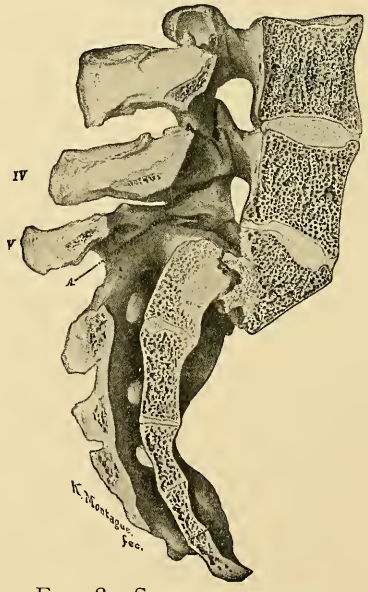

FIG. 18.—SPONDYLOLISTHESIS.

of labor much as does a flat pelvis, but in marked cases the entrance of the presenting part into the pelvis is seriously interfered with by the displaced lumbar vertebrae which overhang the pelvic brim. If the pseudoconjugate diameter in these cases is under eight centimeters,

cesarean section is the operation of election, since the delivery of an average sized child through a pelvis of this size is practically impossible. If the pseudoconjugate diameter is more than eight centimeters, spontaneous delivery is sometimes possible. This variety of deformed pelvis is, however, so rare that, if an arbitrary limit of nine centimeters is set for the limit of spontaneous labor, and all patients with a pseudoconjugate diameter less than that are submitted to cesarean section, very few mistakes will occur.

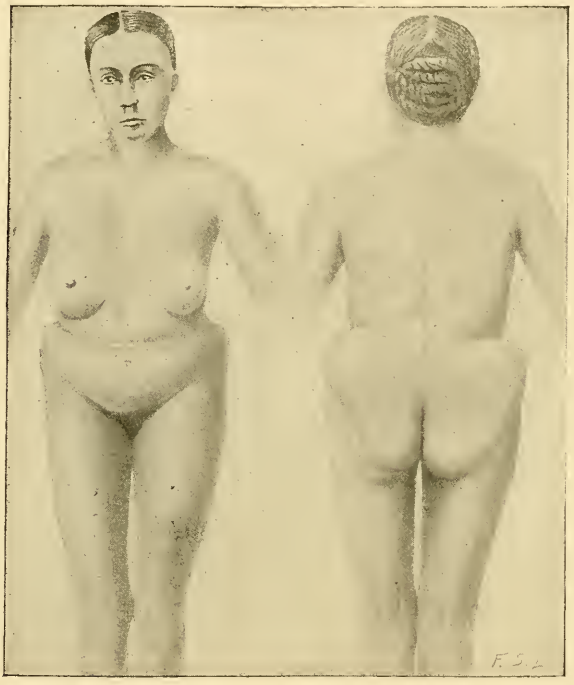

FIG. 19.—WOMAN WITH SPONDYLOLISTHESIS.

Coxalgic Pelvis.—Hip disease, occurring in early life, gives rise to an obliquely contracted pelvis. If the disease begins before the child has learned to walk, or if the child is confined to its bed for a considerable length of time, the diseased side of the pelvis shows definite atrophic changes and is distinctly smaller than the other half of the pelvis.

When the child begins to stand the body weight is transmitted in great part to the well leg, either because of the shortening of the diseased leg or from fear of pain as a result of throwing weight upon it. The pelvis thus becomes obliquely tilted, the well side being the higher. The increased force transmitted to the well leg tends to push that side of the pelvis upward, inward, and backward, and an oblique contraction re-

sults, which involves both the superior and inferior straits. Not uncommonly ankylosis of the sacro-iliac joints occurs. As a rule the oblique contraction is found on the well side of the pelvis, but when the diseased leg is ankylosed in a position of abduction and internal rotation the reverse is said to be the case.

Oblique contraction of the pelvis also occurs in cases of one-sided congenital dislocation of the femur, though usually to a less degree than in disease of the hip, and similar changes may occur in untreated unilateral infantile paralysis or in cases of shortening, due to disease of the knee or ankle, or after amputation.

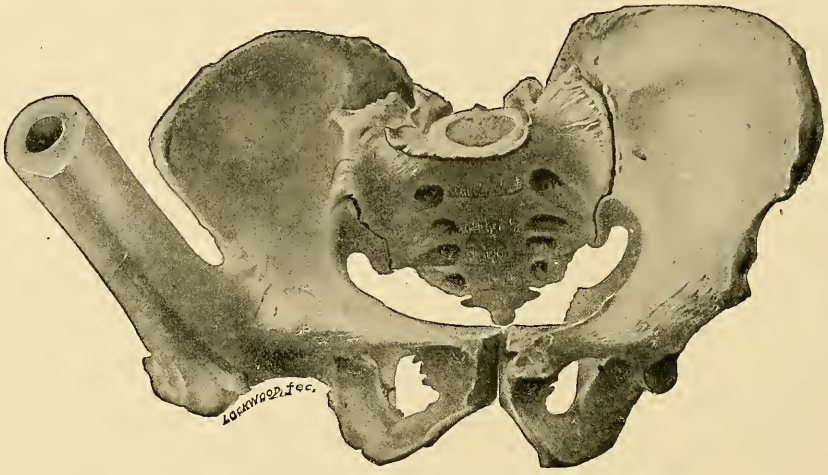

FIG. 20.—COXALGIC PELVIS WITH ANKYLOSED FEMUR.

The possibility of serious pelvic contraction can hardly be overlooked in these cases, since the patient shows a pronounced limp on walking. If questioning elicits the information that the condition has existed since early childhood, it is probable that pelvic examination will show atrophy of the diseased side of the pelvis in combination with oblique contraction of the well side. Careful examination will give accurate information as to the nature of the deformity, but its effect on labor can only be estimated by careful exploration of the cavity of the pelvis under anesthesia, which may be difficult, since the diseased leg may be ankylosed in such a position as to interfere seriously with the necessary manipulations. The ordinary pelvic measurements are of no value in estimating the degree of contraction, and those suggested by Nägele for use in oblique contraction will not give the full information required, although they will afford some help. Fortunately the degree of contraction is seldom extreme, but serious interference with labor may occur. The deformity involves the inferior as well as the superior strait, and the position of

the ankylosed leg may interfere seriously with operative procedures undertaken to deliver the patient.

If examination under anesthesia demonstrates the fact that engagement is improbable, an elective cesarean is indicated, as it is also in multiparae with a history of previous dystocia. If there seems to be no serious obstruction to engagement, if the child is not larger than the average, and if the outlet is not seriously contracted, it is probable that delivery through the pelvis will occur and the case should be left to nature, under careful observation. In these cases a modified test of labor, conducted under careful asepsis, will often determine the proper treatment of the case. If after four or five hours of good first stage labor, the

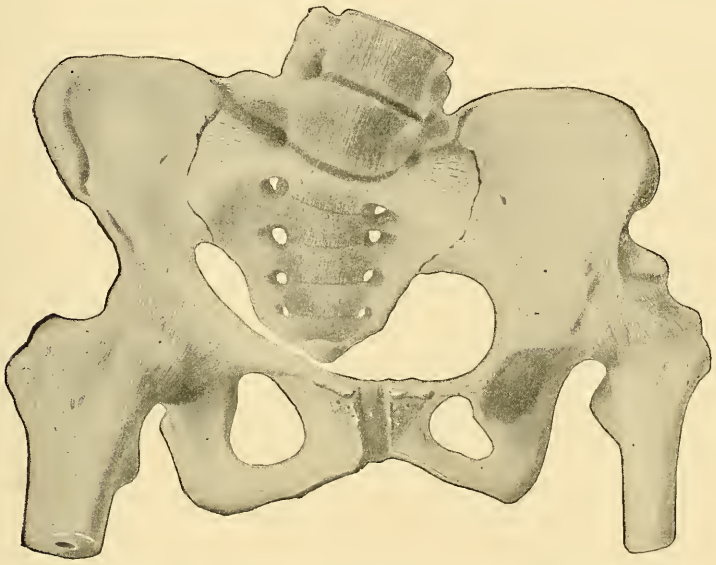

FIG. 21.—PELVIS OBLIQUELY CONTRACTED FROM TENSION OF DISLOCATED FEMUR.

head shows no sign of entering the pelvis, the conservative policy should be abandoned and the patient delivered by the abdominal route.

Obliquely Contracted, or Nagele Pelvis.—This form of contracted pelvis is of very rare occurrence, but causes serious dystocia in the majority of instances, when found. The main characteristics are an oblique contraction, involving both the brim and outlet, combined in most cases with ankylosis of the sacro-iliac joint on the affected side. The cause of the pelvic deformity is a lack of development, or even practical absence, of the sacral alae on one side, which results in an oblique contraction. The patients do not limp, and the ordinary pelvic measurements do not show the degree of contraction. The attendant's attention

should be called to the presence of some abnormality by the fact that one iliac crest is higher than the other, and that a more or less marked

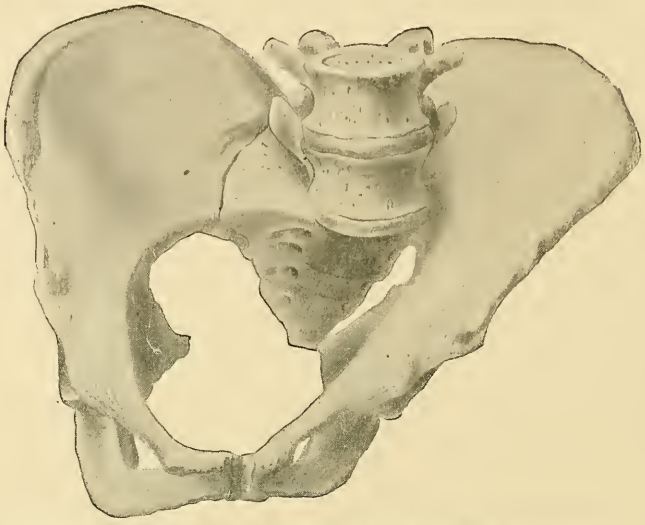

FIG. 22.—PELVIS OBLIQUELY CONTRACTED (FROM IN FRONT).

scoliosis is present, when further investigation will reveal the deformity. Since careful examination of the pregnant woman is the exception and

FIG. 23.—PELVIS OBLIQUELY CONTRACTED (FROM BEHIND).

not the rule, most cases pass unrecognized till the development of dystocia calls for careful investigation. The importance of early recognition is considerable, because in all but slight cases delivery through the pelvis

is impossible and pubiotomy is out of the question, owing to the ankylosis of the sacro-iliac joint. In marked degrees of contraction either cesarean section or craniotomy is necessary for delivery, and the former is indicated whenever the deformity is discovered during pregnancy or at a period of labor which does not contraindicate abdominal delivery.

Transversely Contracted, or Robert Pelvis.—This form of contracted pelvis is seen when the sacral alae on both sides are imperfectly developed. Examination shows that all the transverse measurements are markedly shortened, while the anteroposterior measurements are practically unchanged. It is an exceedingly rare form of contracted pelvis, but in all reported cases the transverse narrowing has been so great as to render the birth of a living child impossible. Cesarean sec-

FIG. 24.—PELVIS TRANSVERSELY CONTRACTED.

tion at the time of election, if the condition is discovered as it should be before the onset of labor, is the only rational treatment.

Osteomalacic Pelvis.—Osteomalacia is a very rare disease in this country, but occurs sufficiently often so that every obstetrician of large hospital experience is liable to meet with an occasional case. Since the vertebral column and pelvis are the portions of the skeleton most affected, it has a special importance obstetrically, particularly since the pelvic change increases in repeated pregnancies, so that instead of labor becoming easier it may eventually become impossible and require cesarean section for delivery.

The history of these patients is usually quite characteristic and aids greatly in the diagnosis of the condition. The parturient woman, usually a multipara, complains of muscular symptoms, generally involving the iliopsoas muscles, associated with rheumatoid pains. The same symptoms

recur with increased severity in each succeeding pregnancy and labor is more difficult than ever before. If pregnancy again occurs, the pains become more severe and locomotion is so interfered with that for the last months of pregnancy the patient is bedridden and craniotomy or cesarean section is necessary at the time of labor.

FIG. 25.—OSTEOMALACIC PELVIS (FROM ABOVE).

Shortly after delivery the pains disappear, and when the patient is able to be up and about again she notices she is some inches shorter than

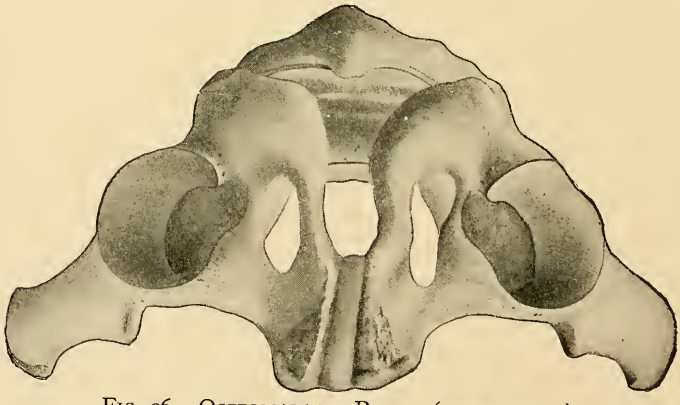

FIG. 26.—OSTEOMALACIC PELVIS (FROM BELOW).

previously, and at times kyphotic changes develop in the vertebral column.

The changes in the pelvis depend entirely on the degree of softening of the pelvic bones. In the early stages of the disease a simple flattening results. In the later stages, when the bones have become very soft, the pelvic cavity becomes so compressed by the pressure of the body weight

that labor is impossible. The pelvis may take on almost any shape, according to the direction in which pressure is transmitted to it. In all but early cases, in which the pelvic change is slight, cesarean section is the operation of choice, followed by removal of the ovaries, since this procedure is said to be successful in producing a cure of the disease, although its effect may be simply that of preventing further progress by rendering pregnancy impossible.

Atypical Pelvic Deformities.—In rare cases the pelvis may be more or less deformed by the presence of exostoses at various points, and less frequently by tumor formation.

Exostoses.—Exostoses most frequently occur on the posterior surface of the symphysis, just in front of the sacro-iliac synchondroses, or upon the anterior surface of the sacrum. In very rare cases they may be found along the iliopectineal line. In exceptional cases they may be of sufficient size to cause a serious obstruction to labor, but their effect is more likely to be that of causing injury to the maternal soft parts, and several cases have been reported in which they have cut through the lower uterine segment and have caused serious hemorrhage, or even death. If they seem to be of sufficient size to cause dystocia, or sharp enough to endanger the maternal soft parts, cesarean section offers the safest means of delivery.

Tumors of the Pelvis.—Tumor formations of various kinds may arise from the walls of the true or false pelvis and reach such proportions as to render labor impossible. Enchondromata are the most common variety, but fibromata, osteomata, carcinomata, and osteosarcomata have been described. The dystocia depends principally on the size of the tumor and the degree to which it obstructs the pelvic cavity. The growth is apt to be rapid during the pregnancy, and, therefore, the degree of obstruction can only be properly estimated shortly before the beginning of labor.

Before the introduction of cesarean section in the treatment of these cases, 50 per cent of the mothers and 89 per cent of the children are said to have perished. Cesarean section is, therefore, indicated in all cases in which the cavity of the pelvis is markedly obstructed by a new growth; and in less marked cases, in which a trial of labor may be allowed, the progress of the case should be most carefully watched, and if there seems to be any doubt as to the passage of the head through the pelvis after a few hours of labor, section should be promptly resorted to.

Old Pelvic Fractures.—In rare instances healed fractures of the pelvis may render delivery through the pelvis absolutely impossible. The

obstruction may be due either to excessive callus formation, or to projection of the broken ends of the bones into the pelvic cavity. This cause of dystocia is a very uncommon one, owing to the comparative rarity of fractures of the pelvis and to the frequency with which such patients succumb to the internal injuries which accompany the fracture of the pelvis, so that comparatively few survive and fewer still become pregnant.

The effect on labor depends on the location of the fracture, the degree of callus formation, and the displacement of the ends of the bones. The ordinary pelvic measurements give little or no clue to the internal conditions, and the pelvis should be thoroughly palpated under anesthesia, if necessary, to determine the degree of obstruction. In all cases in which any doubt as to the result of labor exists cesarean section is the operation of election.

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CHAPTER IV

NON-PELVIC INDICATIONS FOR CESAREAN SECTION

Cesarean Section in Pelvic Obstruction Not Due to the Pelvis Itself—Tumors of the Uterus—Fibromyomata—Carcinoma of the Cervix—Tumors of Other Organs—Ovarian Tumors—Prolapse of Kidney or Spleen—Echinococcus Cysts—Tumors of Bladder—Tumors of Rectum—Atresia of Birth Canal—Vulva—Vagina—Cervix—Uterine Displacements—Anteflexion—Retroflexion—Dystocia Following Operations for Uterine Displacements—Cesarean Section on Account of Previous Incision of Uterus—Bibliography.

When cesarean section was first recognized as an operation which could be legitimately performed as an elective procedure, instead of as an operation of last resort, its employment for some time was limited to cases in which no other means of securing a living child was believed possible, and pelvic obstruction was the one indication which was considered to justify its performance.

With the progress of time, increasing experience has proved it to be a relatively, though not absolutely, safe operation in properly selected cases when performed under proper conditions, until at the present time it is recognized that it may properly be substituted for a pelvic delivery in cases in which, though the delivery of a living child may be possible, the risk to the life or health of the mother and the risk to the child are sufficient to warrant the selection of abdominal delivery, as being on the whole the safest method of delivery when the interests of one or both patients are considered in the light of the conditions present in the given case. In other words our position at the present time is that, whenever cesarean section offers any marked advantage to either patient over vaginal delivery, cesarean section becomes the operation of choice. This change of opinion has been gradual, and one indication after another has been added to the list of indications for the operation, until at the present time scarcely any obstetric complication remains, for which cesarean section is not enthusiastically recommended in the literature, and successful cases are reported to support the contention of the operator. The unsuccessful cases, however, are apt not to be reported, and the literature does not fairly represent the results of the operation.

In some cases cesarean section is a life or health saving operation, and the gain to the patient is very great; in others it is merely the

lesser of two evils, the outlook not being good in any case for a satisfactory result; and in still another group of cases it is performed without adequate reason, being merely the easiest way out of a trying situation for the attendant, without due regard for the well being of the patient, either present or future. It is important, in undertaking any operative procedure to effect delivery, not to lose sight of the fact that it must be of real benefit to the patient; and that unless the patient is a Catholic no operation should be undertaken which seriously endangers her life for the sake of saving the child, when any other method of delivery is possible which may be safer for her. Furthermore, the fact that one cesarean section is likely, in the majority of cases at least, to be followed by cesarean section in future pregnancies, should lead to conservatism in regard to its performance for temporary indications which will probably not recur in subsequent pregnancies.

These facts should be borne in mind in choosing the method of delivery in all cases in which there is a reasonable choice, and the operation selected should be chosen after careful consideration of the pros and cons, and not simply as the operation best suited to the ease of the operator, which is today one of the leading indications for the performance of cesarean section, with the result that many maternal lives are sacrificed, which would be saved if the proper operation had been selected.

Tumors of the Uterus and Other Pelvic Organs.—Tumors connected with the uterus or other pelvic organs may so obstruct the pelvis as to render the entrance of the presenting part impossible, and thus may furnish an absolute indication for abdominal delivery.

Fibromyomata of the Uterus.—Fibromyomata of the uterus may seriously complicate pregnancy and labor. The effect which they produce varies markedly with their size, number, and location. Miscarriage may result from the associated endometritis. Interference with the circulation of the tumors may cause sloughing at any period of pregnancy, or their rapid growth may cause pressure symptoms which may call for operative relief before the baby reaches the period of viability. In the majority of cases, however, their effect on pregnancy is slight.

If a patient passes through pregnancy without serious trouble, the only effect which fibroids in the upper portion of the uterus will have on labor is to interfere with the uterine contractions to a greater or less extent. In a patient with multiple fibroids, with a rigid undilated cervix, in whom the trial of a few hours of labor demonstrates the fact that the uterine contractions are too weak to effect proper cervical dilatation, cesarean section may properly be considered as the safest means of

delivery. This is even more the case, since there is always a possibility of sloughing of the tumors during the puerperium, and, furthermore, an operation must usually be performed at some future time for the removal of the fibroids and the cure of the patient. The section should, in these cases, be followed by a supravaginal amputation of the uterus. If the fibroids exert no influence on the labor, the wisest course is to deliver the patient from below and reserve the curative operation for a later date, in the hope that it may be rendered unnecessary by the involution of the tumors after delivery, the increase in the size of the tumors during pregnancy being largely due to edema, and not to actual hypertrophy.

Fibroids of the lower uterine segment or cervix may so obstruct the pelvic canal as to render the entrance of the fetal head into the pelvis apparently hopeless. In such a case it is wise to reserve the actual decision as to the best method of treatment until the patient goes into labor, or the estimated date of labor is reached, since it is a matter of common experience that tumors which seem to block the pelvis hopelessly a few weeks before the onset of labor may be drawn out of the pelvis toward the end of pregnancy and cease to offer an obstacle to delivery. Many cases are reported in which the tumor has remained in the pelvis until after labor has begun, and then has been drawn up out of the pelvis under the action of the uterine contractions. This solution of the difficulty, however, fails to occur in the majority of such cases, and the danger of operation after prolonged labor is so greatly increased that the wisest course is to deliver all such patients by cesarean section, when the tumor so blocks the pelvis as to prevent the entrance of the presenting part at the beginning of labor, the operation being completed by hysterectomy or not, according to the size and accessibility of the tumors and the condition of the patient. Occasionally tumors atrophy and disappear during the puerperium and a radical operation may not be necessary, but if the uterus contains several good sized fibroids, this is hardly to be expected, and in any case the patient should be removed to a properly equipped hospital, where any surgical procedure which may prove necessary can be performed under proper conditions.

Carcinoma of the Cervix.—Cancer of the cervix, complicating pregnancy, may, in rare cases, be a legitimate reason for a cesarean section. This will depend, however, on the period of pregnancy at which the diagnosis of cancer is made and the apparent operability of the case. When the diagnosis is made early in pregnancy and the disease is apparently so limited in extent that it seems probable that the patient can be cured by operation, the only proper treatment is a complete hysterectomy by the Wertheim method without regard to the pregnancy, the

mother being the more important of the two, and her life being dependent on the prompt removal of the growth. The fact that cancer increases rapidly during pregnancy renders the operation almost an emergency one, since the delay of even a short time may render the case inoperable. If the case seems to be inoperable when first seen, the child becomes the more important patient, and every effort should be made to prolong the pregnancy to the period of viability, in its interests. If the mother begins to fail rapidly after the child is viable, but before full term is reached, the child should be delivered by cesarean section, since this method is the safest for it, and under the circumstances can do the mother no harm.

If the disease is discovered during the latter part of pregnancy and is supposed to be operable, the child should be delivered by section and the uterus removed, in the attempt to save both patients. If, however, the case is considered inoperable, the pregnancy should be allowed to go to term and the method of delivery chosen according to the local conditions. In some cases the involvement of the cervix and vaginal wall will be so extensive that any attempt at delivery through the vagina is likely to be accompanied by such extensive laceration and hemorrhage as to shorten the life of the mother, even if it is possible to secure sufficient dilatation of the cervix to render delivery possible. In cases of this nature cesarean section is the operation of choice in the interests of both patients, since it will not only increase the safety of the child, but will prolong the mother's life.

Ovarian Tumors.—Ovarian tumors not infrequently complicate pregnancy and add greatly to the dangers of the condition. In many cases the pedicle becomes twisted during pregnancy and a prompt operation is the only means of saving the patient's life, and in other cases rupture of the tumor occurs during labor, which is sure to be disastrous, if the tumor is either a dermoid or of a malignant type. Owing to this fact, it is generally agreed that the discovery of an ovarian tumor in the first half of pregnancy should call for prompt operation and its removal, and experience shows that the operation will not interfere with the progress of pregnancy in the majority of cases.

When the tumor is discovered in the latter part of pregnancy, the treatment depends on the symptoms it causes and on its location. If the tumor is free in the abdominal cavity it should be removed promptly, at any time previous to the last month of pregnancy, and even then if it is causing any symptoms, since it is a constant menace to the patient. It is not an indication for cesarean section, unless it is so situated as to interfere with labor, though symptoms of twisted pedicle may arise

either during labor or during the puerperium, which will necessitate immediate laparotomy. In some cases, however, the tumor becomes prolapsed into the pelvis in front of the presenting part in such a manner as to effectually prevent the entrance of the presenting part and thus render a pelvic delivery impossible, unless a reposition of the tumor can be effected. In some cases postural treatment by means of the kneechest position will prove successful, and the tumor will become replaced above the pelvic brim. This often fails, however, and the removal of the tumor is necessary to free the pelvis. Some authorities recommend that

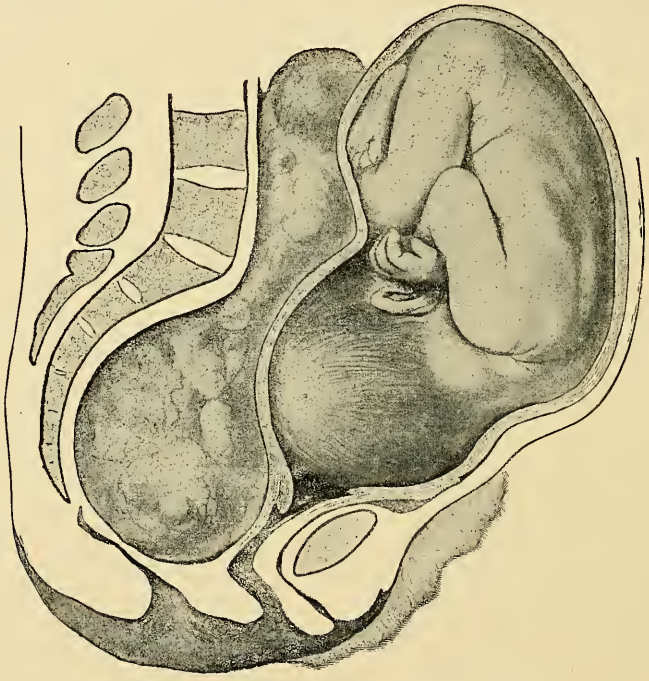

FIG. 27.—DYSTOCIA FROM OVARIAN CYST.

the patient be allowed to go into labor, laparotomy being performed and the tumor removed when the cervix is nearly fully dilated, and delivery then being effected by forceps or version. In some cases, however, the tumor will rupture with disastrous results, if submitted to the pressure of labor, and the wisest course would seem to be to deliver the patient by cesarean section at the time of election and remove the tumor at the same time. A considerable proportion of these tumors are either dermoid cysts or of a malignant nature, and to subject the patient to the danger of rupture of such tumors is distinctly unwise. For the same reason puncture through the vagina is absolutely contraindicated.

Since laparotomy is indicated for the removal of the tumor, the most

satisfactory treatment for all ovarian tumors which are so situated as to interfere with delivery is cesarean section and ovariotomy, and the results will be better under this method of treatment than if the patient is allowed to undergo the exhaustion of a long labor and then is subjected to a laparotomy. The only disadvantage of this method of treatment lies in the fact that the scar left in the uterus acts as a point of weakness and possible rupture in future pregnancies and labors, and at the present time there is a strong feeling among most surgeons that, if a patient is once delivered by section, future deliveries are most safely accomplished in the same way. I personally believe that, if a patient has once been delivered by cesarean section, it is distinctly unwise to allow her to go into active labor in future pregnancies, although if the uterine wound has been properly sutured and if the convalescence has been absolutely afebrile, the risk involved is probably not a great one; but I believe it to be greater than that of repeated cesarean section at the time of election.

Tumors not Connected with the Generative Organs.—Interference with labor by tumors not connected with the pelvis or generative tract is of rare occurrence, but must be borne in mind as a possible indication for cesarean section.

Kidney or Spleen.—Prolapse of normal or enlarged kidney into the pelvis may so obstruct the pelvic cavity that, if it is not discovered and removed during pregnancy, cesarean section will prove necessary for delivery, a small number of such cases being reported in the literature. One case has been reported in which a prolapsed spleen was removed from the pelvis in the second month of pregnancy, thus suggesting that in rare instances a prolapsed spleen, which is not discovered during pregnancy, may prove a serious obstruction to labor and necessitate cesarean section.

Echinococcus Cysts.—Large echinococcus cysts may occupy the pelvic cavity and necessitate cesarean section in very rare instances.

Tumors of the Bladder.—Tumors of the bladder may sometimes interfere with the normal mechanism of labor, but are rarely large enough to call for radical interference; but large calculi, unless removed, may cause sufficient obstruction to render abdominal delivery necessary.

Tumors of the Rectum.—Large tumors arising from the rectum or pelvic connective tissue may so obstruct the pelvis as to render cesarean section necessary. Cancer of the rectum has had this effect in a considerable number of cases, and other tumors less frequently.

Atresia of the Generative Canal.—Vulva.—Incomplete atresia of the vulva may present, in rare cases, such an obstacle to delivery that it is either impossible or sure to be attended with such extensive laceration

that cesarean section is the wisest course, in order to prevent serious damage with its consequent invalidism. This condition is usually due to cicatricial changes, consequent either upon trauma or upon severe inflammatory conditions, and in most cases the scar tissue will soften during pregnancy sufficiently to permit delivery without too extensive injury. If, however, the scar tissue does not soften during pregnancy, cesarean section should be performed as the only means of preventing serious damage and the possible invalidism which may follow. The same holds true in women who have suffered serious injury to the soft parts in previous deliveries and who have been subjected to extensive repair operations, since delivery per vaginam will very probably result in serious damage, the repair of which may prove unsatisfactory.

Vagina.—Incomplete vaginal atresia may give rise to serious dystocia at the time of labor. The cases which cause serious trouble are almost always secondary in origin and result from the extensive formation of scar tissue following injuries or inflammatory processes. In the great majority of cases the cicatricial tissue undergoes marked softening during pregnancy, and the pressure of the presenting part after labor begins overcomes the obstruction sufficiently to permit of manual dilatation or incision, without too great risk of serious damage. In cases in which no softening occurs during pregnancy and the obstruction remains so resistant that dilatation seems improbable or likely to result in serious damage to the surrounding structures, cesarean section is indicated at the onset of labor.

Tumors of the Vagina.—Solid tumors of the vagina or surrounding tissues may offer an insuperable bar to labor. When the tumor is accessible excision is indicated, but if the tumor is first discovered shortly before the estimated date of labor or during labor, cesarean section may be necessary with removal of the tumor later.

Cervix.—Cicatricial stenosis of the cervix frequently follows laceration occurring during difficult labor associated with infection and considerable destruction of tissue. Less frequently it may be due to syphilitic ulceration and induration. In rare cases it may result from the use of strongly corrosive substances employed for the purpose of producing abortion, and not infrequently it may result from gynecological operations for the repair of extensive lacerations, and is especially liable to follow amputation of the cervix, which is, therefore, an operation of doubtful expediency in women of the childbearing age.

Ordinarily the circulatory changes incident to pregnancy result in sufficient softening to render dilatation at the time of labor possible, or the stenosis will yield to dilating bags or to manual dilatation. In rare

cases, however, the rigidity is too great to be overcome by these means, and in such cases cesarean section is indicated early in labor, as soon as the condition is appreciated, since, unless prompt delivery is accomplished, stretching of the lower uterine segment will occur which will eventually result in rupture of the uterus, when relief is not given by abdominal delivery. In rare cases complete atresia of the external os may occur, due of course, to some process which has arisen after conception has taken place. Cesarean section offers the only means of relief in such cases.

Occasionally in elderly primiparae, and rarely in younger women, true rigidity of the cervix occurs and nature's methods of dilatation prove absolutely ineffective. The condition is also seen in an even more marked degree in patients who have suffered from inflammatory conditions involving the cervix. The choice of operation in these cases lies between abdominal and vaginal cesarean section and depends on the other conditions present, the size of the child and pelvis, the dilatability of the vagina and perineum, and whether the cervix can be drawn down to the vulva or is held high in the vagina by an inflammatory exudate. If labor comes on more than a month before the estimated date and the child is so small that vaginal delivery will prove an easy matter after the cervical obstruction is removed, vaginal hysterotomy is the operation of choice for such patients. If, however, the patient is at or near term and in good condition for cesarean section, this operation will ordinarily prove the most satisfactory method of delivery.

Uterine Displacements:—Anteflexion.—In primiparae marked anteflexion of the uterus with the development of a pendulous abdomen usually affords evidence of the existence of a marked disproportion between the head and pelvis. Such a condition calls for careful examination before the onset of labor, and if serious disproportion is discovered cesarean section is indicated at the time of election. In multiparae this condition is usually due to the relaxed condition of the abdominal walls; and since any dystocia which may develop is due to faulty transmission of the force of the uterine contractions to the cervix, good results will sometimes follow the application of a tight abdominal bandage to hold the uterus in a relatively normal position, and cesarean section is only to be considered in cases in which the present child is out of proportion to the pelvis, it being larger than the former children, or when a moderate test of labor shows unsatisfactory progress.

Retroflexion.—In the great majority of cases in which the uterus is in retroflexion when conception occurs one of three results takes place. Either the impregnated uterus becomes restored to its normal position

spontaneously or by artificial means, the patient aborts, or incarceration of the retroflexed uterus occurs with urgent symptoms which call for relief.

In very rare cases, however, the pregnancy may go on to term, the fundus of the uterus remaining attached to the floor of the pelvis, while the anterior wall hypertrophies sufficiently to allow room for the development of the fetus. In this condition the head of the child occupies the fundus of the uterus, while the cervix is sharply bent and drawn upward, so that the external os lies above the level of the symphysis. When labor begins the uterine contractions tend to force the child through the most dependent portion of the uterus, i.e., the fundus, and the cervix dilates only partially. Spontaneous labor is out of the question. In some cases the cervix is fairly easily accessible and delivery can be accomplished by manual dilatation followed by version. In other cases, however, cesarean section offers the only hope of delivery, and if the case is left to nature, death of the mother from infection or rupture of the uterus is inevitable, since it is impossible to reach the cervix per vaginam to effect dilatation and delivery. An early diagnosis is essential to success under these conditions.

Dystocia Following Operation for the Relief of Retropositions of the Uterus.—The recognition of retrodisplacements of the uterus as a cause of ill health has led to the development of many operations for their relief. Several of these, although they rectify the malposition, may give rise to serious dystocia if the patient attempts to have children in the future. For several years it has been recognized that ventro- and vaginal fixations of the uterus are particularly liable to result unfavorably in future labors, and it has more recently developed that even a simple suspension may occasionally result in a fixation, even in the best hands, and cause dystocia. Operations of the Gilliam and Baldy types seem to be much less liable to cause trouble than the other operations, but I have seen one instance in which such distortion of the uterus resulted following a Gilliam operation as to render cesarean section the safest means of delivery, if not absolutely the only means.

The fixation of the fundus of the uterus to the abdominal wall produces various results during pregnancy, but in a general way the mechanism of the dystocia is as follows: the fundus being fixed by firm adhesions which prevent its mobility, the anterior wall of the uterus can only take part in the enlargement necessary for the accommodation of the growing ovum, if the cervix is drawn up out of the pelvic cavity, and even then its development is only partial. As pregnancy goes on the hypertrophied anterior wall is represented by a thick mass of muscle.

while the posterior wall is stretched in many cases almost to the point of rupture, and since this is the portion of the uterus which must act to expel the fetus, it is evident that the contractions will often prove feeble and inefficient and that delivery must be accomplished by operative means.

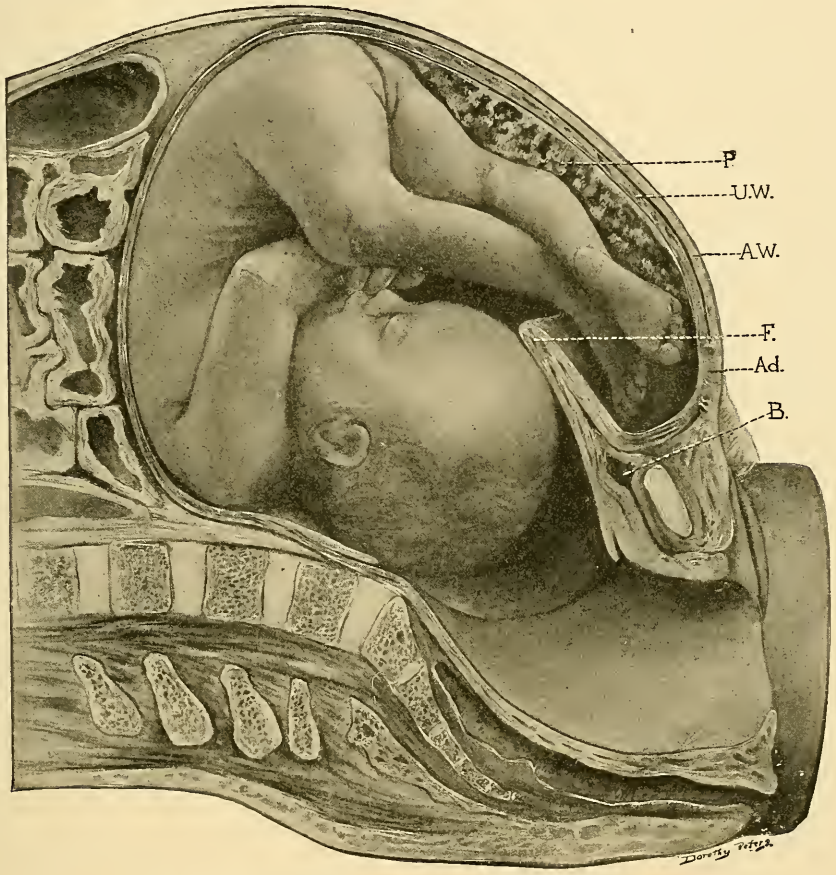

FIG. 28.—DYSTOCIA RESULTING FROM VENTROSUSPENSION.

A.W., abdominal wall; U.W., uterine wall; Ad., adhesion between uterus and anterior abdominal wall; B., bladder; F., anterior uterine wall, folded; P., placenta.

The possibility of delivery per vaginam depends largely on the position of the cervix. In some cases the anterior wall takes little part in the development of the uterine cavity and remains simply a thickened mass of muscle, while the cervix occupies its normal position, or nearly so. Such cases can be delivered by manual dilatation, followed by either forceps or version, due care being taken not to rupture the distended posterior wall of the uterus. In other cases, perhaps the majority, the

stretching of the posterior wall exerts marked traction on the cervix, with the result that some stretching of the anterior wall occurs, and the cervix is displaced upward and backward, being sometimes even above the level of the promontory of the sacrum and out of reach, while the pelvic brim is obstructed by the thickened anterior wall. Labor in such cases is ineffective and carries with it some danger of rupture of the posterior wall, while operative delivery from below is practically out of the question, owing to the inaccessibility of the cervix, which interferes with attempts at dilatation and with extraction of the fetus, if dilatation is secured.

Cesarean section is the operation of election in all cases in which there is marked upward displacement of the cervix, and may properly be combined with an attempt to separate the adhesions which fix the uterus to the abdominal wall. The greatest care must be taken in these cases to secure adequate contraction of the thinned out posterior wall after the extraction of the child, to prevent postpartum hemorrhage, and the uterus should be watched until proper contraction and retraction occur before the abdomen is closed. Unless proper contraction of the posterior wall can be produced, supravaginal amputation of the uterus should be performed, since, if the improperly functioning uterus is replaced and the abdomen closed, serious postpartum hemorrhage may follow with possibly fatal results.

Previous Cesarean Section or Other Operations on the Uterus.—"Once a cesarean section, always a cesarean section" is a dictum which has been laid down by some authors and denied by others. That it is impossible for any patient who has had a cesarean section to be delivered by vagina in a subsequent pregnancy, is a statement which is manifestly absurd, since many patients have been delivered either spontaneously or by easy forceps operations, and rarely by version, with perfectly satisfactory results, when allowed to go into labor in subsequent pregnancies. On the other hand a certain small percentage (2-3 per cent) have suffered rupture of the uterine scar, either during pregnancy or labor, in later pregnancies. When this accident has occurred the majority of the patients have died from hemorrhage or peritonitis, but a sufficient number have shown such slight symptoms from the rupture that it is not possible to predict that even rupture of the uterus, when it occurs, is necessarily the dangerous accident in these cases that it is when it occurs during labor as a result of overstretching of the lower uterine segment or of improper operative procedures. Even though the mother has survived in these cases, the child is almost inevitably lost and laparotomy is usually necessary to effect delivery, so that it is a fair statement

that in all of the cases in which rupture occurs a disastrous result has followed.

After studying the scar in a series of cases in which the uterus had been removed for various reasons at the time of a second cesarean section, Williams came to the conclusion that a well healed cesarean scar is not a menace to the patient in later labors, and that in some cases no evidence of scar tissue can be found, even on microscopical examination. He, therefore, believes that if the wound is properly sutured primarily, and if the convalescence is afebrile, showing a complete absence of infection in the uterine wall, it is safe to allow the patient to go into labor, always supposing that the cause which rendered the first cesarean section necessary is no longer present.

On the other hand it is a common experience, in performing repeated cesarean sections, to find either a very thin scar at the site of the previous uterine incision, which would be a source of danger if labor were permitted, or to find that in a portion of the old wound the uterine musculature has separated and the fetal membranes or placenta are covered only by peritoneum, even in patients in whom no history of infection of the wound at the previous operation can be obtained and when the previous operation was performed by a competent surgeon so that there can be no suspicion that careless methods of suture were employed.

In the light of such conflicting evidence, it is evidently impossible to lay down any definite rule which can be applied to all cases, but each case must be considered on its merits. If the operation is performed for a permanent indication, e.g., for disproportion between the child and the pelvis, the dictum holds true, unless the baby is so much smaller in the second pregnancy that the disproportion no longer exists. If the primary operation was performed for temporary reasons, e.g., placenta previa or eclampsia, and there were no complications to point to a weak scar, it is perhaps permissible to allow the patient to attempt labor, if she is in a hospital, so that prompt operation can be performed at the earliest indication of trouble; but even in such cases the danger to the patient is, in my opinion, such that I prefer to deliver every patient by cesarean section, if she has been previously so delivered, except when the patient is in active labor and delivery is imminent when she is first seen by the surgeon.

In the cases in which the patient has been in labor for some time when first seen and examination shows that rapid progress has been made in dilatation of the cervix and that the presenting part is well in the pelvis, so that it is evident that labor will soon be terminated if left to nature, there can be no excuse for cesarean section, but labor should be ter-

minated by forceps as soon as the cervix is fully dilated, so as not to subject the uterine scar to the dangers of the increased strain of the second stage of labor.

I strongly believe, however, that cesarean section at the time of election offers the safest method of delivery for patients who have been previously delivered by that operation. My own experience has been that in spite of the evidence in favor of a competent scar in uninfected cases, a certain number of scars are thin and weak, and I feel that we have no means of predicting the competency of the scar in the individual patient. This belief is based on personal observations in repeated cesarean operations on patients who have had afebrile convalescences after operations performed by presumably competent surgeons, and on reports of other cases in which rupture of the old scar has occurred either during pregnancy or labor under similar circumstances. It is undoubtedly true that the great majority of cesarean scars in such cases will stand a labor of average severity perfectly well, but it is impossible to predict which patient will suffer from uterine rupture, if allowed to go into labor. A sufficient number of scars do rupture to constitute a very real danger, even though the actual percentage is small. I feel that the danger of rupture is greater than the risk of the repeated operation and, therefore, believe that it is improper to subject a patient to a greater risk when a course which involves a less risk can be pursued. I am, therefore, accustomed to advise every patient who has once been delivered by cesarean section to have any subsequent pregnancies terminated in the same way.

There can be no question about the advisability of such a course in patients in whom the indication for the primary operation is a permanent one, since the reasons which rendered the first operation advisable remain unchanged, and in fact are strengthened by the fact that the scar left in the uterus by the first operation affords an added source of danger, if the patient is allowed to attempt labor.

In patients in whom the primary operation was done for some temporary indication, which is no longer present at the time of the second labor, I consider the presence of the uterine scar a sufficient indication for a repetition of the operation, although it may not always prove necessary in cases who have had an afebrile convalescence following the first operation. It should, however, be considered obligatory in patients who give a history of a febrile convalescence, since this points to the probability of uterine infection and unsatisfactory healing of the uterine incision, and it is in these patients that the rupture of the scar in subsequent pregnancies and labors is most to be feared.

In patients who are seen in subsequent labors well advanced in labor

with the head well in the pelvis and the cervix fully or nearly fully dilated, a repeated cesarean section is certainly unnecessary and unwise, but the labor should be terminated as promptly as possible after full dilatation is accomplished, to prevent all possible strain on the scar and thus minimize any possible danger of rupture. It is not in my opinion a question as to whether a pelvic delivery may not be possible without rupture of the uterus, but I believe that the fact that a certain number of presumably competent scars do rupture is a sufficient reason for never intentionally allowing such a patient to run the risk of labor when conditions are such as to warrant a repeated cesarean section.

A similar condition exists when the uterus has been operated on for the removal of myomata located deeply in its substance. If the tumors were subserous or were so situated that a fairly thick layer of normal muscle remained between the bed of the tumor and the uterine cavity, there need be little or no apprehension as to the behavior of the uterine scar at labor. If, however, the tumors were submucous, so that the uterine cavity was opened or the endometrium exposed during their removal, there is sure to be considerable formation of scar tissue, just as in septic cesarean scars, and the danger of rupture late in pregnancy or during labor is markedly increased. These cases should be watched most carefully during pregnancy and are best delivered by cesarean section at the time of election, rather than exposed to the danger of rupture of the uterus during labor. The same holds true for patients who have suffered a rupture of the uterus in a previous pregnancy or labor and have recovered to again become pregnant, although there are cases on record in which spontaneous delivery without complications has followed a rupture of the uterus in a previous labor.

In brief, the question may be summed up by the statement that whenever any condition exists in the uterus, which, in the opinion of the attendant, renders cesarean section a safer method of delivery for the given patient than a pelvic delivery, cesarean section should be performed. Opinions may differ and equally good men may take opposite positions for what seem to them good and sufficient reasons, but each operator must be guided by his own experience and do what he conscientiously believes is best for the given patient, and he will find authority for which ever course he may pursue. My own personal feeling is that, although in only a small percentage of cases will the uterine scar be found so inefficient as to expose the patient to a serious danger of rupture, except when the previous convalescence has been definitely febrile, none the less the safest course for the patient is repeated section. When the original cesarean indication is still operative, there is absolutely no question as to the proper

procedure, and a repeated cesarean section is the only proper treatment.

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CHAPTER V

OTHER INDICATIONS

Cesarean Section in Toxemia of Pregnancy—Placenta Previa—Separation of the Placenta—Cardiac Disease—Poor Physical Equipment—Poor Nervous Equipment—Elderly Primiparae—After Operations for Repair of Previous Injury—Malpositions of Fetus, Breech, Face, Transverse—Postmortem Cesarean Delivery—Abdominal Abortion—Bibliography.

There remains for consideration a group of indications for the relief of which cesarean section is often recommended and performed, but in which the choice of operation may be open to criticism from so-called conservative members of the profession. These conditions are sometimes temporary in character and sometimes permanent. The question to be decided in the individual case is not whether cesarean section is necessary to effect the delivery of a living child, but rather, whether it does not carry with it certain advantages to one or both patients which more than compensate for the increase in risk which is attendant on any abdominal operation. The gain to the patient may be increased safety to life or health at the present time, or it may be simply that, by eliminating the strain of labor, certain complications which are sure to arise in the future may be postponed at a minimum increase in the immediate risk. There is no question but that cesarean section offers the safest method of delivery for the child, and in cases in which the child is of paramount importance it may be indicated for this reason only, as long as it does not seriously increase the danger to the mother.

In considering these indications it is well to state that disproportion between the child and pelvis will not be considered as a factor, although if such disproportion exists, it naturally increases the urgency of the other indications, and they in turn may settle the choice of the operation in border line cases; but the question at issue is merely to consider the advisability of cesarean section in certain conditions when it is admitted that other methods of delivery, though possible, have very definite disadvantages. In other words the operation may be performed as the wisest method of meeting a situation which can be dealt with in other ways.

Toxemia of Pregnancy and Eclampsia.—It is out of place in a

discussion of cesarean section to consider the merits of the various methods of treatment for such a complication as the toxemia of pregnancy, but it is impossible to discuss methods of delivery and their relative advantages in a serious condition without briefly summarizing our present knowledge of the condition which calls for relief.

Toxemia is a condition arising during pregnancy only and, therefore, dependent to some extent at least on the pregnancy. The exact cause of the condition is unknown, and there may be multiple causes, any one of which associated with pregnancy may give rise to the disease, if it may be so called. Careful prenatal care will undoubtedly prevent a large proportion of the cases and will give an opportunity for its early discovery and treatment, if it does develop, with rather more than an even chance that all threatening symptoms will subside promptly, and that, in a certain proportion of the remainder, they will be relieved or held in abeyance, though not entirely cured. In a certain proportion, however, treatment has no effect, the toxemia increases, and the patient is in imminent danger of eclampsia, unless she is delivered or unless the baby dies as a result of the maternal toxemia, after which the symptoms as a rule subside, although in a small proportion of cases the death of the child results in, or at least is followed by, an increase in the toxemia.

Most of the cases of true eclampsia develop in the group of patients who do not yield to eliminative treatment, or who do not receive adequate prenatal care, and the best interests of the patient demand the termination of the pregnancy whenever the treatment of the toxemia fails. This is to be done by the method which seems to be the most conservative one for the given patient, after all the circumstances in the individual case have been considered. Severe toxemia, unless accompanied by chronic nephritis, is most often seen in primiparae in whom induction of labor and operative delivery is most apt to be difficult and attended by unsatisfactory results for both mother and child. In cases without pelvic disproportion the method of delivery is usually to be selected according to the condition of the maternal soft parts and the urgency of the symptoms. If the vagina is not rigid, and if the cervical canal is obliterated, so that labor may be easily induced by the use of a dilating bag, or in favorable cases by manual dilatation and delivery, which will be found to be the case in the majority of instances, the pelvic route is indicated. If, however, the cervix is rigid and the canal not obliterated, so that pelvic induction seems to promise marked difficulty, and if the toxemia is rapidly increasing, either vaginal or abdominal cesarean section is indicated, since in this type of case induction of labor often proves a slow and unsatisfactory procedure and time is an object. If the patient is markedly

premature with a small, possibly non-viable child, vaginal cesarean section is the preferable procedure, but if the child is large and the condition of the soft parts is such that serious laceration seems inevitable, if the pelvic route is selected, abdominal cesarean section offers very definite advantages for both patients. This is particularly true in elderly primiparæ who may never have other children and to whom the possible loss of the baby during delivery is a relatively more serious matter than it would be to younger women, although it is never fair to any patient to take serious risks for the child, no matter what her age, when these risks can be avoided without seriously increasing the danger to her.

The development of eclampsia in patients who are under efficient observation, except in patients who present no premonitory symptoms (a very small class), should be extremely rare, since it is an evidence of lack of proper care or of lack of appreciation of the needs of the patient in the presence of threatening symptoms. There is a growing feeling among authorities who have followed the results obtained in prenatal clinics, that with proper care eclampsia may be made an almost obsolete condition; but this can only be accomplished by education of both the lay and medical public to an understanding of the mutual advantages to be derived from careful prenatal observation of every patient and the importance of prompt action in the face of threatening symptoms. The condition is, however, still sufficiently common, so that it demands attention.

When eclampsia develops, a new problem complicates the situation. The patient is admittedly in an exceedingly dangerous condition, due at least in part to the pregnancy, and best relieved by the termination of the pregnancy, if that can be accomplished without adding to the danger. The patient is usually, however, profoundly shocked by the convulsions, and it is a grave question whether she can be delivered by any operative means without increasing the danger by adding shock to shock.

There are two distinct schools at the present time in regard to the proper treatment of eclampsia, the radical and the conservative. The radical school demands immediate delivery of the eclamptic patient as soon as convulsions occur, on the basis that, since eclampsia is in some way dependent on pregnancy, the only logical method of treatment must include termination of pregnancy by some means. Accouchement forcé, the dilating bag, vaginal cesarean and abdominal cesarean, all have their adherents, and each in the hands of certain operators has given fairly satisfactory results when compared with the results obtained in other clinics where operative delivery is practiced as a routine, but the mortality following operative treatment of the patients who are having

convulsions is so high, no matter what method is used, as to suggest the wisdom of a change in policy.

If the obstetrician is committed to a policy of immediate delivery in all cases of eclampsia, cesarean section has a place, though it should not, in my opinion, be employed to the exclusion of other methods. If the patient is a primipara, especially if over thirty-five years of age, with a small, rigid vagina and a long, hard cervix, which will probably resist attempts at dilatation, by any means, vaginal cesarean section is indicated if the child is markedly small and premature, and abdominal cesarean section if the child is near term and well developed. The results of operation will be better in this class of case, if the patient is delivered by cesarean section, than if she is subjected to a difficult or violent accouchement forcé, but the maternal mortality will still be high enough to prove that the operation is by no means a panacea.

In the last few years the statistics of cesarean section for eclampsia have improved markedly, the mortality having progressively dropped from 75 per cent, as reported by Halbertsma in the early series of cases, until at the present time it is little, if any, higher than the mortality obtained by other operative measures, between 20 per cent and 30 per cent, and is definitely lower than this in properly selected cases of the type of patient described above.

In eclampsia, occurring in patients in whom the cervical canal is obliterated and the external os relatively soft and easily dilatable, cesarean section has no place, since the induction of labor on appropriate cases, and even accouchement forcé, will give equally good results and will leave the patient in a condition to have normal labors in future pregnancies.

The members of the conservative school claim, and statistics would seem to support them, that while it is undoubtedly logical to end the pregnancy, if it can be done without killing the patient, the shock of an operative delivery in any patient already shocked by repeated convulsions may turn the scale against her and result in death, when a more conservative policy might succeed in saving her life. They claim that in most cases labor will be initiated by the convulsions and that by waiting for labor and treating the toxemia in the meantime, instead of operating on every patient at the earliest possible moment, many lives will be saved; and this view is supported by the published statistics, although the mortality still remains fairly high, varying from 6.6 per cent to 10 per cent in different series of cases. This mortality is probably largely dependent on the toxemia which is the underlying cause of eclampsia and will never be materially lowered until eclampsia is prac-

tically eliminated by prenatal care, and by the delivery of all cases of toxemia in which prophylactic treatment fails before the toxemia produces enough organic damage to cause the death of the patient.

The true place of cesarean section in eclampsia is in those patients who do not start in labor in spite of the convulsions, who are getting steadily worse in spite of treatment, and in whom the condition of the soft parts renders operation from below more dangerous than abdominal section on account of the greater shock involved in accouchement forcé or the prolonged irritation of the cervix, plus the increased absorption of the toxins in cases where a dilating bag is employed. The results of cesarean section in these cases will show a relatively high mortality, but in the aggregate many lives will probably be saved.

The prevention of eclampsia by careful prenatal work and the delivery of the patient before convulsions occur by the most conservative method, which will sometimes be cesarean section, holds out the greatest hope for improvement in results. It is hardly to be expected that the results of abdominal surgery on patients who are thoroughly toxic and whose power of excretion is reduced to a minimum will ever be such as to render cesarean section a proper routine operation for all cases, but there are certain patients for whom it is undoubtedly the most conservative procedure.

Placenta Previa.—The bad results which have attended the treatment of complete or nearly complete placenta previa, when in the hands of any but trained obstetricians, has led many surgeons to recommend the performance of cesarean section in the treatment of this condition as a routine procedure, in the hope of improving the results for both mother and child. There is absolutely no doubt but that the results obtained in the treatment of placenta previa in the community as a whole are unsatisfactory, to say the least, but the underlying cause of the bad results is not the method of treatment, so much as the delay in treatment, as the following statement of facts shows. In general practice uterine bleeding suggestive of the presence of a placenta previa is treated expectantly, a positive diagnosis of the cause being rarely made. As a result the maternal mortality is very high, being ordinarily quoted as 36 per cent. The results obtained in the treatment of the same types of patients in hospital practice under the care of trained obstetric specialists present a marked contrast, the mortality varying from one to four per cent, according to the reports of different clinics, and these figures include the patients sent to the hospital in extremis as well as the cases which arise in the hospital clinic itself.

Such a discrepancy suggests what is undoubtedly true, that the gen-

eral practitioner is not equipped to deal with such an emergency as placenta previa, and either uses poor judgment in his selection of operative methods or operates unskillfully, and, therefore, loses many patients unnecessarily. While both of these hypotheses are to a certain extent true, the real underlying factor in the problem is found in the promptitude with which the symptoms which point to the existence of a serious condition are recognized and met.

In private practice the attendant is prone to neglect the warnings afforded by slight uterine bleeding and defers active measures until the occurrence of severe hemorrhage forces him to deliver a patient who is no longer in proper condition to withstand the shock of a severe operation, with the result that many patients are lost who might have been saved by prompt treatment. In hospital practice and among trained obstetric surgeons the importance of prompt diagnosis of the cause of uterine hemorrhage in the latter half of pregnancy is recognized and, therefore, the majority of cases of placenta previa come to operation in relatively good condition with every reason to expect a successful outcome.

The great majority of cases of placenta previa are best treated either by a Braxton-Hicks version, or induction of labor by means of a large dilating bag, as soon as the diagnosis is made. A few cases, such for instance as a primiparae in whom the hemorrhage is profuse, the cervix rigid, and the canal not obliterated, are best treated by cesarean section. This combination occurs very seldom, since as a rule the cervix is soft, though friable, in placenta previa. It may be met with in primiparae in whom placenta previa is rare, or in multiparae when the cervix is the seat of excessive scar tissue formation, either secondary to inflammatory conditions or extensive operative procedures. It is extremely doubtful whether cesarean section would improve the maternal mortality to any great extent, since the results of the other methods of treatment are satisfactory, if the patient is in fair condition when the operation is undertaken. This is usually the case, unless the initial hemorrhage has been unusually profuse or the warning signs have been neglected, and the performance of an abdominal operation on patients suffering from acute anemia as the result of repeated hemorrhages cannot be expected to give entirely satisfactory results. It is probable that the routine adoption of cesarean section in the treatment of placenta previa will result in an increased, rather than in a decreased mortality.

The keynote of success is prompt delivery by what seems to be the most conservative method for the individual case before the patient has lost enough blood to be in a serious condition. It is undoubtedly true

that in patients who have their initial hemorrhage when at or near term, and in whom examination shows a large child whose relation to the pelvis is doubtful, cesarean section is indicated as the operation of election, in case the mother is in good condition. These cases are comparatively uncommon, however, since in the great majority of cases the initial hemorrhage in complete placenta previa occurs before the eighth month of pregnancy at a time when only extreme pelvic contraction would result in disproportion between the child and pelvis.

Some writers urge that the claims of the unborn child deserve consideration and that cesarean section will do much to lower the fetal mortality. This is extremely doubtful, however, owing to the fact that the initial hemorrhage in complete or nearly complete placenta previa usually occurs at a time when the child is either non-viable or markedly premature. In these cases no method of delivery can give a great improvement in the fetal mortality, and the routine adoption of cesarean section as the method of delivery will probably result in a slight improvement in fetal mortality and a distinct increase in maternal mortality. If the child is at or near term when the emergency is recognized, more children will undoubtedly be saved by cesarean section than by other means, but not if the child is markedly premature, and since the latter is the rule rather than the exception, there is little chance that routine cesarean section will greatly lower the fetal mortality.

The sponsors of cesarean section in placenta previa base their claims as to the advantages of the operation largely on a comparison with the results obtained by accouchement forcé in patients who have been allowed to have repeated hemorrhages. When a comparison is made between the results of cesarean section and the use of the dilating bag or Braxton-Hicks version, all performed on patients who are delivered as soon as the diagnosis is made, cesarean section will have no better and very probably worse results, except in selected cases, and its adoption as a routine procedure is more likely to result in losing rather than in saving lives. It is only fair to say, however, that various German authorities have enthusiastically adopted this procedure as a distinct advance in the treatment of these cases. Cesarean section is, in my opinion, only indicated in the treatment of placenta previa when the cervix is rigid and its canal is not obliterated, or in patients at or near term when the child is apparently out of proportion to the pelvis.

Premature Separation of the Normally Situated Placenta.—Concealed or accidental hemorrhage is one of the most dangerous complications of pregnancy and labor, practically all of the children, and, according to Goodell, 50 per cent of the mothers being lost. If the hemorrhage

is mostly external, the prognosis is largely dependent on the amount of blood lost, but the fact must be borne in mind that comparatively slight external bleeding may be accompanied by serious intra-uterine hemorrhage, and any patient in whom the symptoms of hemorrhage are out of proportion to the amount of external bleeding should be looked on as an emergency for whom delivery is urgent. It must be remembered also that in a certain number of these patients the uterine musculature is practically disintegrated by the hemorrhage into it, and that after delivery these patients may die from postpartum hemorrhage, due to the atonic condition of the uterus, while in other cases a degree of unrecognized intraperitoneal hemorrhage occurs before and after delivery which is sufficient to prove fatal, unless checked by the removal of the uterus.

In severe cases the mother can only be saved by a prompt emptying of the uterus, which should be accomplished by the method which seems to be most conservative for the individual case. In patients in whom labor has begun and is going on in a satisfactory manner, so that the cervical canal is obliterated and the os partly dilated, the case may be left to nature, unless the symptoms are urgent, although careful observation should be maintained in order that an increase in the amount of the internal bleeding may be met by prompt delivery. In the great majority of cases, however, the placental separation occurs before labor begins and cesarean section offers the most conservative method of delivery, since it not only involves less shock than a prolonged manual dilatation followed by version, but it also affords the operator an opportunity to inspect the uterus and to remove it, if it is found to be so atonic from disintegration of its musculature due to hemorrhage into its substance that postpartum hemorrhage is probable, or if bleeding is going on into the peritoneal cavity. It is fair to say that in all cases in which the uterus has taken on the ligneous feel, which is so characteristic in these cases, abdominal delivery is the most conservative treatment, even though the cervix is partly dilated, on account of the freedom of action which it affords, since the uterus can be removed or conserved at will after careful inspection and the patient's life thus saved when she might otherwise succumb to postpartum hemorrhage, if delivered per vaginam. In the same category should be placed the exceedingly rare case in which rupture of a uterine varix occurs during pregnancy or labor, causing symptoms of internal hemorrhage.

Cardiac Complications of Pregnancy.—Heart disease complicating pregnancy and labor offers a wide field for the employment of cesarean section. In these cases we have an opportunity, not only of saving the patient's life in the immediate present by substituting the short strain

on the heart involved in a laparotomy for the prolonged strain of labor, but also of preserving her health in many cases and preventing her from becoming a cardiac invalid for at least a considerably longer period than would otherwise be the case. The strain of pregnancy has been thoroughly demonstrated to be so serious in patients with cardiac lesions that pregnancy is recognized as contra-indicated in severe cases, and the strain of labor has an even more harmful effect. It is, therefore, important for these women, if they attempt to have children, that they should be safeguarded by every possible means, and that delivery should be made as easy as possible for them and should involve as little strain on the heart as possible, in order to minimize cardiac damage to the utmost.

Valvular Lesions.—It has long been recognized that patients suffering from certain valvular lesions of the heart stand pregnancy badly in many instances and are apt to die during or after labor, or at the best be left more or less permanently invalided. The prognosis is so grave in cases of mitral stenosis, alone or combined with other lesions, that some authorities consider abortion justifiable as the only sure method of avoiding serious cardiac damage. The aortic lesions come next in order, while mitral regurgitation is relatively mild in its effects. In all cardiac patients the most conservative advice would be undoubtedly that pregnancy should be absolutely avoided, since the increased work thrown on the heart during pregnancy exhausts its reserve to some extent and, therefore, ultimately must shorten the patient's life, even if it does not leave her a cardiac invalid. The effect of labor on such a heart is even more serious and many patients die or are left as cardiac invalids as a result of a labor which has been conducted without regard to their needs.

The problem that confronts the obstetrician is a difficult one when such a patient comes to him for care, since she has been placed in a position which inevitably involves a lowering of her cardiac reserve to some extent, and, which, even if it does not produce immediately serious consequences, is sure to cause some permanent damage, which can only be minimized by extreme care during pregnancy and by the adoption of the method of delivery which involves the least strain on the heart.

As a general rule it may be said that any patient with mitral stenosis or an aortic lesion who has at any time suffered from cardiac decompensation, no matter how slight, should be looked on as a bad risk for labor and as in a serious condition throughout pregnancy. She should be treated as an invalid throughout pregnancy, kept under most careful observation, and delivered by cesarean section at the time of election, in the hope of reducing the amount of cardiac damage to a minimum: and in order to prevent her from taking similar risks in the future, it is

distinctly advisable that she should be sterilized at the time of the operation. The fact that the heart has decompensated at some time is absolute evidence that the patient is in a precarious condition and should receive the most careful attention.

Any primipara with mitral stenosis or an aortic lesion should be delivered by cesarean section, even though she may never have had a failure in compensation, in order to minimize the depletion of the cardiac reserve, since in many cases prolonged or permanent invalidism has followed labor, even though it was not unduly difficult. Sterilization is not necessarily indicated in these cases unless the patient requests it, since if the patient has developed no cardiac symptoms during pregnancy and desires other children, she may be allowed to have them, on the understanding that each successive pregnancy will lessen her cardiac reserve to some extent and therefore shorten her life, although practical invalidism during pregnancy and cesarean section at term will reduce the damage to a minimum. Patients suffering from mitral regurgitation are in much less serious danger, and if the heart has never shown any signs of decompensation, may be allowed to go into labor, the second stage being cut short by early operative delivery.

Multiparae with well compensated mitral stenosis or aortic lesions may be allowed to go into labor, since the strain of the usually short first stage will not as a rule throw an undue strain on the heart. They should, however, be carefully watched, and, if any sign of cardiac failure occurs, should be delivered promptly by the most conservative method, which will probably be cesarean section, if the cervix is at all rigid and only partly dilated. If the patient has at any time previously had signs of decompensation, cesarean section at the time of election will prove in many cases a life saving procedure.

Myocarditis.—The condition of the heart muscle is even more important than the presence of a valvular lesion, and patients who are believed to be suffering from myocarditis, whether acute or chronic, are better risks for cesarean section than for labor, since a prolonged difficult labor not infrequently results in acute cardiac dilatation, which is always serious and may prove fatal. These patients often suffer from symptoms due to a lack of cardiac response during pregnancy. Most of them are flabby muscularly and anemic, owing to their inability to take sufficient exercise in the open air to keep up their general condition, due partly to cardiac discomfort and partly to the necessity of throwing no avoidable strain on the heart. Shortness of breath is common, and the heart action is often irregular, the pulse often varying from 20 to 50 beats on minor exertion, although the heart sounds are normal. These

cases are very common following acute infections, such as influenza, occurring during pregnancy, the burden of pregnancy preventing the heart muscle from being restored to its normal condition, since the complete rest of the heart necessary to accomplish this cannot be obtained, owing to the increasing burden which pregnancy throws on the heart. Cesarean section in these cases affords a means of preventing a strain on the damaged muscle, which may cause permanent damage, and thus will often prove a health saving, if not a life saving procedure.

Poor Physical Equipment.—Closely analogous to the patients who present an actual myocarditis, are the patients who are physically poorly equipped for the burden of labor, although they show no actual lesions to attract the attention of the obstetrician. They are usually frail, anemic women, and the history of the past life suggests that, although perhaps never actually sick, they are never actually well. In these women the burdens of their ordinary life seem to be all that they can bear, and although never actually breaking under the strain, the break seems always imminent. These patients usually react badly to pregnancy and do not improve in physical condition as pregnancy goes on. If such women are subjected to the strain of a hard labor, they are often left in such an exhausted condition that a prolonged period of invalidism follows, and they may never regain their normal, though feeble health. Cesarean section offers to such patients a means of conserving energy which is vitally important to them and should be seriously considered in women of this type as a means of avoiding the chronic ill health that is so often induced by a labor of not more than average severity. Undoubtedly the immediate risk to life is slightly greater than that of delivery by vagina, but the advantages to be gained as regards future health by a slightly increased risk to life are very real.

Poor Nervous Equipment.—Closely related to these patients, and yet in a different group, are the patients whose nervous equilibrium is unstable, women whose past history shows a lack of resistance to the nervous influences of their environment. It is not uncommon to find patients, a large part of whose adult life has been spent in taking rest cures for nervous exhaustion, fancied or real, whose margin of safety from a serious nervous collapse is extremely small. Such women are very prone to respond badly to the strain of labor, and to them pain is a real evil. They represent in our civilized communities a type which would have been largely eliminated, if medical care had not interfered with the law of the survival of the fittest. Experience leads me to believe that, if this type of patient is subjected to the strain of pregnancy, and especially of labor, neither she nor her physician of the moment

will cease to regret it. I say advisedly "physician of the moment," because she wanders from doctor to doctor in search of mental health which cannot be given. If such a patient is allowed to go into labor, it may be months or years before she recovers from the shock to her nervous system, and a prolonged attack of nervous prostration is often the sequel. These women fortunately stand the shock of an operation remarkably well as a rule. What they cannot recover from is a long strain, particularly if much pain accompanies it, and all pain is exaggerated to them. They seem to react especially well to cesarean section, which, by eliminating the pain of labor as well as relieving them of the burden of pregnancy, leaves them in a peculiarly favorable condition for recuperation, at least in part, and they often leave the obstetrician's care in better condition than he found them in, if treated in this way.

It may seem radical to urge a major operation to avoid nervous strain, especially to those who do not meet this type of patient in their local communities; but I am satisfied that these patients are the abnormal product of an overcivilization and are much like hothouse plants and must receive special treatment. If they are treated as ordinary patients, the results are seldom satisfactory to either doctor or patient.

Elderly Primiparae.—It is very common to hear of patients who, being pregnant for the first time in the late thirties or early forties, have been allowed to go into labor which has proved unsatisfactory, and have then been subjected to a brutal pelvic operation, with the result that the child is lost and the patient so badly lacerated that secondary operation has been necessary to restore her even partially to health, the time lost sometimes precluding the possibility of another pregnancy, so that she is thus left childless. This policy is a relic of traditional obstetrics, which presupposes that any woman who becomes pregnant must have her child in the natural way, and works a very grave injustice to a class of women to whom one living child represents all that they can ask for. I am far from advocating that every elderly primipara should be delivered by cesarean section, but I do believe that the ordinary rules which govern the choice of method of delivery should be widely extended in these cases, and that if, after careful examination, any abnormality can be found, if the head remains high, even though the pelvis is normal, or if the soft parts are sufficiently rigid to suggest the probability of serious laceration, the patient should be given the opportunity of having a cesarean section if she so desires, the increased safety to the child and the avoidance of laceration being the principal advantages to be gained. If it is decided to allow such a patient to go into labor, the progress should be carefully watched, and if the uterus functions improperly or

if the cervix does not dilate as it should, the so-called conservative policy should be abandoned and the patient delivered promptly by section. Manual dilatation, followed by forceps or version, in these cases offers so great an increase in the risk to fetal life and maternal health that cesarean section is a conservative operation by comparison, and its performance will save many such women from prolonged ill health and from the regrets of a childless old age.

Cesarean Section to Prevent Pelvic Damage Following Operations for Repair of Previous Injury.—It not infrequently happens that women who have suffered serious laceration in previous labors and have undergone extensive operations for repair of the injuries again become pregnant, and the question arises as to how such patients should be delivered, in order to give the best possible results. Certain facts are evident. The normal vaginal tissues have been largely replaced by scar tissue as the result of the operation, and scar tissue is less likely to stretch well during delivery than normal tissue. In addition, the patient has suffered sufficiently from the lesions caused by the previous labors to be willing to undergo an extensive operation for repair, and the probability is that delivery per vaginam will result in damage at least as serious and possibly more so than occurred in the previous deliveries, owing to the abnormal conditions left after operation.

The principal factors to be taken into consideration in such cases are the nature of the injury in the previous labor, the amount of scar tissue and the degree of softening which it undergoes under the influence of the increased congestion of pregnancy, and the degree of inconvenience suffered by the patient before being operated upon. If the previous labor resulted in injury to the bladder or rectum, the danger of recurrence with the possibility that a satisfactory result may not be obtained at a second operation warrants the performance of a cesarean section, in place of subjecting the patient to the inconvenience and ill health consequent on such an accident.

If the previous damage has resulted in prolapse of the vaginal walls with cystocele and rectocele and possibly prolapse of the uterus, the extensive operation for repair necessarily leaves a large amount of scar tissue in the vagina. If this scar tissue becomes succulent and softened during pregnancy, there is a fair chance that a pelvic delivery may occur without serious damage, but if the patient's health has suffered severely during the interval between the laceration and the operation for repair, it will be wiser, in most cases, to deliver the patient by section rather than subject her to a possible recurrence of the ill health, which can be relieved only by a secondary operation, which may or may not

prove a success. If the scar tissue remains rigid in spite of the increased congestion, it is almost certain that serious laceration will occur if pelvic delivery is attempted, the repair of which may not prove a success, and delivery by cesarean section offers the best method of delivery when all factors in the problem are considered.

It cannot be claimed in these cases that cesarean section is at all a necessary operation for delivery, but that it is the wiser course when everything is taken under consideration, since it is a good working principle in obstetrics that abnormal patients are best treated in an abnormal way, and that the attempt to treat them as if they were normal will meet with disaster in many instances. The preservation of health is only secondary to the preservation of life, and when health can be practically promised at a slight increase in the risk to life, that risk is worth taking.

Cesarean Section in Malpositions of the Fetus.—Within the last few years certain writers have advocated cesarean section in almost all cases in which the fetus presents in any other way than by the vertex. Breech, face, and transverse presentations have all been cited as being indications for cesarean operation, largely, it seems to me, because it is an easier method for the operator and requires less technical skill and judgment for successful delivery.

It is perfectly possible that cesarean section may prove the best method of treatment in many of these cases, but the indication is the cause that produces the malposition rather than the malposition itself, considered in relation to the other conditions present in the given case.

Breech Presentations.—In primiparae breech presentations have a bad reputation, owing to the difficulty of determining whether the size of the fetal head is out of proportion to the maternal pelvis, and to the fact that the proper care of breech presentations involves a degree of judgment as to when or whether extraction should be undertaken, and so much skill in its performance that an average fetal mortality of 10 per cent occurs. This mortality is much less in skilled hands, since it is largely due to unwise attempts at delivery, through an imperfectly dilated cervix. If the breech is not in the pelvis at the beginning of labor, and if the baby is unusually large, or if the pelvis is contracted, cesarean section may properly be considered, but the indication is not so much the breech presentation as the other factors which are present in the case, such as disproportion between the child and the pelvis, early rupture of the membranes, and unsatisfactory dilatation of the cervix.

In multiparae cesarean section is practically never indicated for breech presentations per se in the absence of other indications.

Face Presentations.—Primary face presentations occurring in primiparae almost always indicate sufficient disproportion between the head and the pelvis to warrant the belief that some obstruction exists which prevents the entrance of the head into the pelvis. Careful examination, especially under anesthesia, will reveal the facts, and cesarean section may very properly be the indicated procedure, if such disproportion is marked. If, however, as is usually the case, the face presentation develops during labor, the problem is not so clear. Even in these cases there may be definite disproportion in cases in which the head remains high and does not enter the pelvis and the proper treatment can only be determined by careful examination. If the face seems to be entering the pelvis, a moderate test of labor should be given, the progress being followed by rectal examination. If progress is unsatisfactory, especially in posterior positions of the face, examination under ether will indicate the proper treatment, but if good progress is made, a pelvic delivery is indicated.

In multiparae, whose previous obstetric history is normal, a face presentation is seldom or never a complication which will call for abdominal delivery.

Transverse Presentations.—Transverse presentations in primiparae, except in multiple pregnancies, are an indication of sufficient pelvic contraction to warrant the assumption that cesarean section is probably the best method of delivery, since the disproportion between the head and pelvis is usually marked in these cases. Furthermore, an operative delivery is necessary in all cases at term and the danger to the life of the child and the soft parts of the mother is sufficient to cause anxiety on the part of the attendant. Both patients, therefore, have an improved prognosis in abdominal delivery.

In multiparae with a normal obstetrical history cesarean section will seldom be the operation of choice and practically never, on account of the malposition, if uncomplicated by other conditions which may indicate an abdominal delivery.

Postmortem Cesarean Section.—Although cesarean section was originally employed, at least as far as authentic records show, for the purpose of delivering women who died in the latter portion of pregnancy, either in the hope of obtaining a living child, or so that mother and child might be buried separately, it is at present comparatively rarely performed. The latter indication, i.e., the separate burial of mother and child, seems to have lost its force under the Christian era, and the operation is now performed only occasionally on the dead and then for the sake of possibly preserving the fetal life.

Living children have been delivered up to one hour after the mother's

death, and, therefore, it would seem, theoretically at least, as if some attempt should be made to save the child, in case of maternal death, after the period of viability has been reached.

Experience has shown, however, that in cases of maternal death, accompanied by gradual respiratory failure, as in pneumonia, or after a lingering illness, the death of the child precedes that of the mother by a considerable interval, owing to interference with its supply of oxygen, and that the operation is useless in such cases. If, however, the mother dies suddenly, as for instance from heart failure, or as the result of an accident, the chance of obtaining a living child by operative means should be taken.

One fact, however, must be borne in mind, and that is, the possibility that the diagnosis of death may be a faulty one and that the patient may, in rare instances, recover. This possibility makes it incumbent on the operator to take adequate, though perhaps hurried, aseptic precautions, even at some risk of inviting failure, to avoid the somewhat remote but possible contingency of saving the child at the expense of the mother's life, in case the diagnosis of death should be erroneous. Aseptic preparation of the patient and operator should, therefore, be made, if proper facilities are at hand, so that the mother may not recover from apparent death to die of infection.

Such a patient may very properly be delivered by cesarean section, if conditions proper for the operation are available, and the complete operation should be performed, the uterine incision being sutured just as in the ordinary operation.

If it is not possible to provide for a properly aseptic laparotomy, it is advisable that the operation should not be undertaken, and some authorities feel that, even though such provision is made, a rapid dilatation of the cervix, followed by version and extraction, is the preferable method of delivery. The tissues of a patient shortly after death are usually so relaxed and flabby that delivery from below may be expected to be accomplished as rapidly as abdominal delivery. This method has the advantage of being less likely to do harm in case the diagnosis of maternal death is incorrect, unless full aseptic precautions are observed in the abdominal delivery; but in cases in which marked cicatricial changes are present in the cervix it may prove difficult and cesarean section be distinctly the better procedure.

Abdominal Abortion.—By the term abdominal abortion I refer to the termination of pregnancy before the period of viability is reached, by abdominal hysterotomy, rather than by the more usual methods of performing abortion. This operation may be indicated in any case in

which abortion is urgently demanded by some serious maternal complication and in which sterilization is considered indicated to protect the patient against the dangers of future pregnancies.

This operation is most often indicated in patients who are suffering from cardiac lesions which have resulted in decompensation at some previous time, either when the patient was not pregnant, during previous pregnancies, or in the early months of the present pregnancy, and who are showing symptoms of a fresh decompensation. In these cases the cardiac condition is often such that it seems probable the patient either may not survive the present pregnancy, or that, if she does, she will be left a cardiac invalid during the remainder of her life, and that another pregnancy is almost sure to prove fatal. The choice of operation depends on the patient's condition at the time and on the fact that pregnancy should never be attempted again.

If the patient's condition is so precarious that all possible shock must be avoided in terminating the pregnancy, it is probable that delivery from below, under spinal anesthesia, will prove a slightly safer operation; but such an operation only partially meets the indications in these cases, since it leaves the patient in a condition in which there is danger of future pregnancies, even though great care may be used to avoid conception. For the complete protection of the patient sterilization is necessary, and this can best be accomplished by laparotomy.

If the patient is in fair condition at the moment, the best treatment is laparotomy, removal of the ovum through a uterine incision followed by sterilization, or supravaginal amputation of the uterus without incision, as may be deemed advisable. As a rule, however, the latter operation is more severe and carries with it somewhat greater shock than the former.

In patients with chronic nephritis who give a history of repeated miscarriage or premature labors with dead children abdominal abortion and sterilization is a justifiable procedure. In these patients the chance of a living child is very slight, since the previous misfortunes are directly dependent on a chronic disease which is steadily increasing, and each attempt at pregnancy increases the renal damage to some extent and leaves the patient in a worse condition than before, thereby shortening her life without giving her the satisfaction of a child. Such patients should be protected against the inevitable damage of repeated attempts at pregnancy, as well as against the present one, and this can be accomplished by a single operation, unless the patient's condition is such that laparotomy is considered too dangerous.

To summarize briefly: whenever the patient's condition is such that

abortion is urgently called for and the attendant feels that the indication against pregnancy is a permanent one, the desired result is best accomplished by termination of the pregnancy, and sterilization at a single operation, unless the patient's condition is so precarious that it is felt that termination of the pregnancy is all that should be attempted, and that the question of sterilization should be left for the future in case she reacts favorably to the abortion.

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CHAPTER VI

CONTRA-INDICATIONS TO THE ELECTIVE CESAREAN SECTION

Definition of Elective Cesarean Section—The Absolute Indication—The Elective Operation vs. Operation at the Time of Election—Best Time for Operation—Fundamental Principles Governing the Operation—Conditions Increasing Danger to Maternal Life—Infection—Exhaustion—Attempts at Pelvic Delivery—Infectious Diseases—Surrounding Conditions—Training of the Attendant in Relation to Choice of Operation—Bibliography.

By the term "elective cesarean section" we mean the performance of cesarean section to accomplish delivery when the conditions present in the given case are such that, although it is possible to deliver the patient per vaginam, cesarean section is selected as the preferable operation for the individual patient.

In cases of pelvic contraction so extreme that the extraction of the child cannot be accomplished, even after craniotomy, or when the pelvis is so obstructed by tumors that delivery per vaginam is impossible, the indication for abdominal delivery is absolute, but in most other conditions the obstetrician has at his command various methods by which delivery is possible, and the abdominal delivery becomes an elective procedure. Some operators go so far as to say that, if the choice of any other operative procedure involves the destruction of a living child, the indication for cesarean section becomes absolute, no matter what risks it may involve for the mother, but, in my opinion, cesarean section is under certain circumstances too dangerous an operation for the mother to be undertaken, and I believe that the destruction of a living child is still justifiable in certain cases of neglected labor, and is preferable to cesarean section followed by hysterectomy, unless the risks of the pelvic operation are considered practically equal to those of the abdominal delivery.

In using the term "elective cesarean section" care must be taken not to confuse it with "cesarean section at the time of election." By the latter term we mean the performance of cesarean section, the advisability of which has been already determined, at the time when better results for the mother and equally good results for the child are to be expected than if the operation is performed at any other time. It is to-

day very generally agreed that, if the operation be performed shortly before the estimated onset of labor, or within a few hours after labor has begun, the interests of both patients are served to the highest degree, and that the results of operation at this time will be more nearly ideal than at any other time. The definition of elective cesarean section has already been given.

Certain fundamental principles underlie the success or failure of any surgical procedure, and although under certain circumstances there may be no alternative but to perform the operation in violation of these principles, the results in general will be such as to prove the wisdom of not departing too widely from them when any liberty of choice exists.

From time to time series of cases are published with the apparent object of proving that the principles which govern success in cesarean section may be disregarded with impunity, at least by certain surgeons; but in one such instance it has been my privilege to follow the subsequent work of the author of one of these papers, and it is sufficient comment to say that he has not published the results of his more recent operations, and that those who have followed his lead have not published their results at all.

It must never be forgotten that cesarean section is a major abdominal operation, and that a disregard of the conditions which render abdominal surgery safe will sooner or later bring its own reward. Although the occasional operator may escape, for a time at least, the logical penalty of disregarding surgical principles, the net results of reckless operating will show so high a mortality as to prove the danger of not following the rules which determine the safety of any surgical procedure.

At the present time cesarean section is recognized as an operation of election for the preservation of fetal life or maternal health. If undertaken under proper conditions and in selected cases, it is practically little, if any, more dangerous than any other clean abdominal operation. If the conditions which render abdominal surgery in general safe are not fulfilled, at least to a great extent, cesarean section should not be selected, unless it is the case that any other possible procedure carries with it a practically equal risk to the mother, in which case the preservation of the child may properly prove the determining factor. Being an operation for the preservation of fetal life, it is seldom indicated in cases where the child is known or believed to have perished, except when no other method of delivery is possible, unless the conditions present in the given case render it the safest operation for the mother. If the conditions present lead to the conclusion that, although a living child may be obtained, the mother's life will probably be sacrificed, cesarean section

becomes an unjustifiable procedure, since the maternal life should always be considered as the more important, if choice is possible. Religious scruples on the part of the patient or surgeon may occasionally necessitate the performance of cesarean section under conditions which do not give the mother a fair chance for her life, but in the great majority of cases it may be fairly said that no operation is permissible to save the child which is believed to seriously endanger the mother, when any other operation can be performed which will increase the safety of the mother, even though it may involve the loss of the child.

There are certain conditions which enter largely into the determination of the degree of danger to the mother in any given case, and it is of the utmost importance that these conditions should be recognized and be given careful consideration in the choice of operation. The great majority of patients who present indications for cesarean section can be divided into two distinct groups, the favorable and the unfavorable.

For a patient to be classed as favorable certain conditions must be fulfilled: (1) There must be no suspicion of uterine infection. (2) She must not show signs of exhaustion, whether general or uterine, from any labor which may have occurred. (3) There must have been no attempts at operative delivery from below. (4) There must be no sign of intercurrent infectious disease. (5) She must be so situated that it is possible for the operation to be performed in a properly equipped hospital, or else hospital conditions must be reproduced in the home, and efficient after care must be provided for.

The converse of any of these conditions renders the patient at least a relatively unfavorable risk for cesarean section, and although, under certain circumstances, cesarean section may still be elected as the operation which will on the whole give the best results, the outcome of the operation is more doubtful than if no unfavorable conditions were present, and the prognosis must be stated accordingly. It may be that the patient will prefer not to submit to an operation which carries with it a considerable risk to her life for the sake of a living child, and her preferences must be given adequate consideration, especially if she has other children, since her life is much more important than the life of the child, and she has a perfect right to refuse an operation which carries with it more than ordinary risks to her life for the sake of preserving the child.

Uterine Infection.—That definite uterine infection should be an absolute contra-indication to cesarean section, unless the operation is completed by removal of the uterus, is generally conceded, since the retention of the infected uterus often results in fatal peritoneal infection,

no matter whether a classical or extraperitoneal operation be performed. Some operators attempt to treat these cases by the extraperitoneal operation, but the results are not sufficiently good to warrant the risk in frankly infected cases, although in doubtful cases the operation may be justifiable. A certain proportion of infected patients undoubtedly recover from cesarean section after a stormy convalescence, but the mortality is so great that the conservative operation is absolutely contraindicated in the presence of frank infection, and an abdominal delivery should never be performed under these conditions when any other method of delivery is possible. If, however, cesarean section seems to be the only available method of delivery under such circumstances, supravaginal amputation of the uterus should always complete the operation, and the infected uterus should never be replaced in the abdomen to act as a source of peritoneal infection.

Patients who have been repeatedly examined during labor, even under strict asepsis, are relatively poor risks for cesarean section, since each examination increases the risk of uterine infection, and if the asepsis has been poor or doubtful the risks of the conservative cesarean section are much increased, even though no signs of infection are evident, since it is almost certain that infective organisms have been introduced into the uterine cavity in such cases, and contamination of the peritoneum or infection of the uterine wound is probable. In cases of this nature an extraperitoneal operation will give, as a rule, better results, though if it is possible to avoid abdominal delivery altogether and deliver the patient by some other method, this should be done, unless the child is in excellent condition and cesarean section seems to offer the only chance for its life. Even then, unless the parents elect to run the increased risk for the sake of preserving the life of the child, with full knowledge that it may mean the life of the mother, the operation is an improper one. If the child is not in first rate condition, a destructive operation is preferable, unless extraction of even a mutilated child is impossible on account of pelvic obstruction.

In the same category should be placed patients in whom the membranes have been ruptured for a considerable period. It is a well recognized fact that premature rupture of the membranes predisposes markedly to infection of the amniotic cavity and in some cases to uterine infection. Slemons has shown that infectious organisms not infrequently invade the placenta and are transmitted to the fetus, causing its death by septicemia, either before or a few days after birth. It is evident, therefore, to what danger of peritoneal infection a patient is exposed when under such circumstances she is subjected to an abdominal delivery, since it is

very difficult to avoid infection of the surrounding tissues when the uterus is opened. The wonder is not that the results are bad, if the membranes have been ruptured more than a few hours, but that any patients survive.

Patients in whom attempts have been made to induce labor by means of a bag or bougie, or in whom serious attempts at pelvic delivery have been made by operative means, are also bad risks for cesarean section. No matter how careful the aseptic technic of such procedures has been, there is always sufficient risk of uterine contamination under these conditions to contra-indicate a classical cesarean section, unless followed by hysterectomy, and although an extraperitoneal operation would involve less risk, it is, in my opinion, a doubtful procedure. I personally prefer in such cases to accomplish the delivery per vaginam, if possible, even though it may involve a destructive operation on a living child. The proper time for cesarean section is before the uterine cavity has been infected by repeated manipulations, and the mortality and morbidity which attend cesarean section after attempts at pelvic operative delivery are such as to contra-indicate it when any other method of delivery is possible.

Exhaustion.—The element of exhaustion, as a contra-indication to the elective cesarean section, should receive careful consideration in every patient who has been in labor for any length of time, since it is evident that an exhausted patient is a much poorer subject for abdominal surgery than a patient in good condition, and the mortality and morbidity will be distinctly higher, the greater the degree of exhaustion present, the patient's lowered resistance making even a low grade infection serious, which might cause little trouble if she were in good condition.

Exhaustion in its relation to rendering a patient unfit for abdominal delivery must be considered from a dual standpoint, i.e., general exhaustion from prolonged or excessive labor, and exhaustion of the uterus as evidenced by increasing rigidity or by irregularity of the previously regular contractions.

That general physical exhaustion renders the prognosis of abdominal surgery worse needs little comment, since it is evident that the lower the patient's vitality the poorer her chance of standing a major operation well, and cesarean section should always be avoided when any other means of delivery is possible in these cases. This is particularly the case since the vitality of the child will have suffered to a considerable degree, and serious risks should not be taken for the mother for the sake of a child whose chances of survival are doubtful.

Exhaustion of the uterus should also be considered as markedly in-

creasing the risks of abdominal delivery, and although in patients who have developed signs of uterine exhaustion resulting in rigidity of the uterus, a thinning out of the lower segment, and a rising contraction ring, cesarean section may seem to be indicated as the most conservative procedure under the circumstances, owing to the imminent danger of uterine rupture, if operation is attempted from below, the operation will have a relatively high mortality and morbidity. Hysterectomy in these cases will improve the patient's chances materially, although the substitution of an extraperitoneal operation for the classical one is justifiable, unless the patient is believed to have been already infected and will give greatly improved results.

Intercurrent Diseases.—It may be laid down as a general principle that acute infectious diseases render the prognosis of cesarean section so doubtful as to contra-indicate its performance as an elective procedure. The danger of infection of the uterine wound, with the subsequent infection of the peritoneal cavity, is so much increased in these cases that operation should be avoided whenever possible.

The toxemias of pregnancy have already been discussed as indications for the operation, but it may be well to consider them briefly from the opposite standpoint. Preëclamptic toxemia is a condition of lowered vitality with diminished excretions. Furthermore there is a certain amount of evidence that one of the factors in the production of toxemia may be concealed sepsis, and blood cultures in toxemic women are reported to show a positive growth in a considerable proportion of cases. We have then in these cases two factors which increase the dangers of abdominal operations, auto-intoxication and possibly septicemia.

The two most important objects sought in the treatment of toxemia are: first, the removal of the ultimate cause of the disease—the child—and thus the prevention of the further absorption of toxins; and second the removal of the toxins which produce the symptoms. The major portion of the toxins is presumably excreted through the intestinal tract, and it is well known that it is often very difficult to secure free catharsis for several days after cesarean section. It is evident, therefore, that if the patient has retained in her blood any considerable amount of a virulent toxin, the excretion of which is interfered with by the intestinal paresis following an abdominal operation, the prognosis of the operation will be worse than in a normal patient, and also that the danger from the toxemia may be increased to some extent, owing to lack of prompt elimination of the toxins. These dangers may not nullify the other advantages of cesarean section in the given patient, but they alter the prognosis for the worse, and cesarean section should not be selected as

the routine method of delivery for every toxemic or eclamptic patient, but only when careful examination of the patient shows that other methods of delivery possess even greater disadvantages and section is, on the whole, the less dangerous method.

Chronic nephritis or other chronic diseases must also be considered as altering the prognosis of cesarean section somewhat for the worse, but if any valid reason exists for the performance of abdominal delivery in these cases, it should be performed without hesitation, although the results will show a somewhat increased mortality and morbidity over what is to be expected in women in a normal condition of health.

Acute nephritis from any cause will alter the outlook materially for the worse, and although in toxemia and other conditions which produce acute nephritis the operation may be indicated, the results will not be as satisfactory as in normal women, and abdominal delivery should be avoided, if possible.

In other words any condition which results in lowered vitality and resistance on the part of the patient offers a relative contra-indication to cesarean section, and its performance, under such conditions, is only justifiable when the advantages to be gained more than compensate for the increased risk.

Surrounding Conditions.—There can be no doubt but that the circumstances under which the patient is placed and the surgical skill at her command, as well as the means for proper after care, should have a serious influence on the choice of operation.

The conditions which appertain to a first class surgical hospital, combined with first class surgical skill on the part of the attendant, will do most to ensure a successful result, and the more nearly the circumstances of the patient can approximate these, the better the prognosis. A good result may ordinarily be predicted, however, if the patient's surroundings are such that the ordinary aseptic precautions can be observed during the operation and efficient after care provided for during the convalescence. Unless these conditions can be fulfilled, the patient will have a better chance of recovery after a difficult pelvic delivery than after a laparotomy, and this fact should receive due consideration in the choice of operation, even though it is recognized in advance that a pelvic delivery will probably involve the loss of the child.

Cesarean section has been performed successfully in a farmhouse by candle light and without trained assistants, but a single successful case does not warrant our choosing improper surroundings for our patients when more or less ideal conditions can be obtained. Serious surgery under improper conditions is sure to be attended by a much higher

mortality than if good hospital conditions can be provided, and a room in a tenement house is not a satisfactory operating room. If, therefore, hospital facilities are not obtainable, or to be reproduced in the patient's home, cesarean section should not be elected, if any other operation can be done with due regard to the safety of the mother.

Efficient after care is necessary after any abdominal operation, to ensure first, the safety of the patient, and second, her comfort. Trained nurses are obtainable at the present time in most communities, even where there are no hospital facilities, but if it is not possible to provide for proper after care, cesarean section should not be performed when any other operation is possible.

The surgical skill at the command of the patient is another factor which must enter into the choice of operation. If the attendant has had no surgical training and no trained surgeon can be procured, cesarean section should only be considered as an operation of last resort. Although a classical cesarean section is not an operation of great technical difficulty, and in fact is much easier than any but the simplest obstetrical procedures, safety in its performance demands a thorough knowledge of asepsis, which the average physician not trained in surgery does not possess. Any failure in asepsis in abdominal surgery is liable to prove much more serious than in pelvic operating, since the patient whose peritoneum is infected has little or no chance to overcome the infection, whereas the patient with puerperal infection will, in the great majority of cases, recover, if properly treated. On the other hand, it must be remembered that, although the conservative cesarean section is a simple procedure, it may be necessary in any case to remove the uterus for uncontrollable hemorrhage or on account of previous infection, an operation which requires a surgical training for its proper performance. It is fair to say, therefore, that cesarean section is an operation which should not be undertaken by any operator, unless his training is such as to enable him to carry the operation to its logical conclusion, no matter what complications may arise.

If the attendant or consultant happens to be a trained abdominal operator and yet has had no proper training in obstetric operating, it is conceivable that conditions may arise which will warrant his performing a cesarean section under circumstances in which a pelvic operation would ordinarily be indicated for a properly trained obstetrician, since his special training has fitted him to perform one operation, but not the other, and the patient's chances will be better if he does the operation he is qualified to perform, other things being equal, rather than if he attempts an operation with the technic of which he is unfamiliar. How-

ever, unless the case is an emergency one and the time necessary to summon a properly trained obstetric consultant may mean the life or death of the patient, he is not justified in operating, since it is probable that his judgment as to the needs of the patient will prove just as faulty as his ignorance of obstetric operating is profound, and he will probably perform an operation which not only is unnecessary under the circumstances, but which also exposes the patient to a much greater risk than is proper, simply because in his ignorance of obstetrics he is not qualified to effect delivery, except by the abdominal route.

There is no question but that many cesarean sections are performed every year simply because the consultant called to the case has no knowledge of obstetric diagnosis and technic. He sees a patient whom the family physician has failed to deliver, and, without the proper knowledge to determine what the patient really needs, he empties the uterus by the abdominal route as the easiest method. His surgical conscience would probably not allow him to perform an ordinary operation with so little appreciation of the needs of the patient, and women in labor should not be exposed to such unscrupulous methods. There is no doubt but that many women are sacrificed every year to the lack of professional conscience which permits a surgeon to determine the fate of a patient as to whose needs he is in absolute ignorance, except that it is probably necessary to deliver her by some means, and even then an immediate delivery may not be indicated under the conditions present in the given case.

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CHAPTER VII

PREPARATIONS FOR OPERATION

Time of Operation—Necessity for Prenatal Study—Advantages of Operation at a Fixed Date—Operation Before Completion of Pregnancy—Heart Conditions—Toxemia—Hemorrhage—Precautions, if Test of Labor is Given—Preparation of Patient for Operation—Fixed Date—Emergency—Preparation of Field of Operation—The Operator and Assistants—Instruments and Sutures—Dressings—Choice of Anesthetic; General; Spinal; Local.

Time of Operation.—Unfortunately, owing to a lack of adequate obstetric training on the part of the general practitioner, who is seldom able to properly measure the pelvis, and to the fact that the great majority of pregnant women are not under careful supervision during pregnancy, a large proportion of the cases which come to cesarean section are not recognized as offering indications for the operation, until a more or less prolonged test of labor has demonstrated the need for operative interference. In many cases the failure of the ordinary obstetric operations to accomplish delivery, or the occurrence of severe hemorrhage or convulsions, affords the first evidence that the patient presents a condition which calls for radical treatment, and up to that time both patient and physician have been trusting that, since parturition should be a normal physiological process, nature may be expected to look out for the interests of the patient. That such a condition of affairs is possible is a reproach to obstetric teaching, in that it proves that the great majority of physicians have not been taught to care for obstetric cases properly, since they do not recognize the importance of prenatal examination, and attempt to conduct labor on the time honored theory that pregnancy and labor will progress normally and the attendant is not responsible for any untoward results which may occur. The traditions of obstetrics teach that every woman may be expected to deliver herself or be delivered by an operation of not undue difficulty, and that if she does not and cannot, owing to the conditions present in her case, she alone is to blame. It is only within comparatively recent years that the responsibility of the physician for the welfare of his patient has been recognized and that it is the obstetrician's duty to safeguard his patient by every means

known to modern science. If he is unable to determine himself whether his patient requires more care and skill than he is qualified to give her, he should refer her to an expert for an opinion before trouble arises and not be satisfied to call for help when in many cases it is too late.

Modern obstetric teaching must include a course in prenatal care and careful instruction in pelvimetry and in the estimation of probable disproportion between the child and the maternal pelvis, and every student who receives a medical degree in the future should be carefully instructed that no woman should be considered as normal for childbearing until a painstaking examination has proved her to be so. If intelligent prenatal examination is conducted on these lines, the great majority of obstetric abnormalities will be discovered before the patient goes into labor, and if cesarean section is necessary or advisable, that fact will be discovered before labor begins, and in doubtful cases the patient can be referred to a specialist for an opinion.

Statistics show that the results of cesarean section are best, if the operation is performed at an appointed date a few days before the estimated date of labor, or within a few hours of its onset, before the muscular efforts of labor have been sufficient to lower the vitality of the patient and before repeated vaginal examination has given rise to uterine infection. The selected date will vary somewhat with the indications for the operation, but the most nearly ideal results will be obtained, both for mother and child, if this rule is adhered to. At this time the mother will be in the best possible condition for operation, the increasing irritability of the uterus as the end of pregnancy is approached will ensure the proper contraction and retraction necessary for the control of hemorrhage at the time of operation, and the child will be fully developed and should survive, unless some congenital deformity is present. The size of the child should be carefully estimated, to avoid a possibility of prematurity, and if it seems unduly small, the date of operation should be deferred, in order not to run any risks for it.

Operation before the onset of labor gives an opportunity for careful preparation of the patient for operation, and the comfort of the patient during the early days of the convalescence will be much increased, even though the end results of the operation may be equally successful. The writers who advocate waiting for labor to begin in all cases lose sight of the fact that the obstetrician may possibly be engaged elsewhere at the time when his patient goes into labor and may not be able to come to her for several hours, which may entail much suffering on her part as well as an alteration of the prognosis of the operation for the worse, both as regards mortality and morbidity, a fact which more than counter-

balances any theoretical advantages of operating after the onset of labor.

Experience has shown that the best results are obtained by operation at the time of election, either before labor begins or very shortly after. From this time on every hour of active labor alters the prognosis somewhat for the worse, both as regards mortality and morbidity, both of which are increased if the patient is examined vaginally at frequent intervals to watch the progress of the labor, or if the membranes have been ruptured for any considerable length of time before the performance of the operation.

In late cases, i.e., those who have been in active labor for a long time, on whom many vaginal examinations have been performed, even under adequate aseptic precautions, or in whom serious attempts at pelvic delivery have been made, the prognosis both for mortality and morbidity is such that cesarean section should only be undertaken when the child is in good condition, and no other method of delivery of a living child is possible, and when the facts have been put squarely before the patient and her husband, so that they may understand the dangers of an abdominal delivery under the conditions and have an opportunity to choose whether the risks shall be taken or not, according to the value placed on the child.

Under certain circumstances an earlier date than the normal time of election may be chosen for definite reasons, owing to the desire to avoid certain dangers which may arise either for mother or child.

In certain heart conditions where the margin of safety for the patient is slight, on account of threatened decompensation or because of previous attacks of decompensation, it may seem wiser to save the diseased heart from the strain of the last two weeks of pregnancy by an early operation. If abdominal palpation shows that the child is not undersized, so that its interests will not be sacrificed by the earlier delivery, the date of operation may properly be advanced in the interests of the mother, and if the mother's condition is seriously threatening, the operation may be necessary, even though the child is apparently premature and delivery entails considerable risk for it, since otherwise both patients may be lost.

In severe toxemia, occurring in the last month of pregnancy, when for other reasons cesarean section is desirable, the date may also be advanced rather than to subject both mother and child to the dangers of an increasing toxemia which is either severely threatening or has failed to yield to treatment. In fact, the danger to the child from the maternal toxemia is so great in these cases that moderate prematurity is distinctly less dangerous to its interests than prolongation of pregnancy in the face

of a toxemia which does not prove amenable to treatment. The same rule should be applied to patients suffering from chronic nephritis who have had repeated still births, the child dying in the last few weeks of pregnancy, or in cases of habitual death of the fetus without demonstrable cause.

In the treatment of other obstetric emergencies, such as severe hemorrhage, a similar course should be adopted when the patient is in the last month of pregnancy and cesarean section is indicated by the accompanying conditions. Cesarean section should seldom be performed in patients who are more than four weeks from the estimated date of labor, except in the presence of absolute obstruction of the pelvis or in cases in which it is decided to end the pregnancy and sterilize the patient at the same time. The fact that in these cases the baby's hold on life is precarious, owing to its prematurity, renders it undesirable to subject the mother to an abdominal operation for delivery, unless very definite advantages will result for her from such a course, and in most cases some other method of delivery is both possible and safer for her.

When labor has already begun before the necessity for cesarean section is recognized, or when in doubtful cases a longer or shorter test of labor is decided to be advisable, the operation should be performed as soon as the indication is recognized as positive. Vaginal examination should be avoided in these cases and rectal examination substituted, and the operation is practically never indicated after serious attempts at delivery from below have been made. It must be remembered that every hour of active labor renders the prognosis more serious, and, therefore, no delay should be permitted after the need of the operation is recognized. In these late operations the convalescence may be expected to be somewhat more uncomfortable on the average than when there has been a proper opportunity to prepare the patient for operation, as is afforded by operating at a fixed date.

Preparation of the Patient for Operation.—When the date of operation is fixed the preparation of the patient should begin approximately a week in advance. The patient should be advised to drink as much water as she can force herself to imbibe without suffering actual discomfort. The normal six to eight glasses taken throughout pregnancy should be increased to twelve to sixteen, if possible. This will result in flushing out the system thoroughly, and in addition the tissues will be full of water, and I believe that patients so treated will suffer less from thirst after operation than if this routine is not carried out. The diet during this period should be so regulated that as little waste may be left in the intestinal tract as possible at the time of operation, and yet

the nutrition maintained at a high level. During the last twenty-four hours before operation the diet should be light and easily digestible, foods which tend to gas formation being avoided.

The bowels should be kept freely open during this period, though active catharsis should be avoided, on the theory that it predisposes to intestinal discomfort afterwards. On the evening before operation the lower bowel should be cleansed by an ordinary soap suds enema, which should be repeated in the morning, about two hours before the time set for operation. Severe catharsis the night preceding operation is to be avoided. In the first place it accomplishes no useful purpose, if the bowels have been previously kept normally active, and by depriving the patient of sleep often brings her to operation in a more or less exhausted condition with a somewhat lowered vitality. Furthermore, some surgeons believe that catharsis just before operation increases the tendency to post-operative vomiting. If a cathartic is given the night before operation, let it be a mild one. Castor oil, which is very commonly used as a cathartic in the preparation of patients for laparotomy, is to be avoided in these cases, on account of the very definite tendency to initiate labor and thus render an operation necessary in the middle of the night, which could be performed to better advantage in the morning.

It is a good plan to give the patient a mild hypnotic the evening before operation, to ensure a good night's rest and to prevent her from lying awake worrying about the ordeal of the morrow.

Preparation of the Field of Operation.—The preparation of the field of operation varies with the personal preferences of the operator. Personally, when preparing a patient for operation at a fixed date, I prefer to begin the preparation the night before. The patient is given a full bath, preferably a shower bath, if possible. The abdomen, pubic region and vulva are then shaved and scrubbed with soap and water for five minutes. The soap is washed off with sterile water and the abdomen scrubbed with 70 per cent alcohol for three minutes. A sterile dressing is then applied and left in place until one hour before operation, when it is removed and the abdomen is painted with half strength tincture of iodin, and another dressing applied. After the patient is anesthetized for operation the dressing is finally removed and the abdomen painted once more with half strength iodin. The field of operation is now surrounded by sterile sheets and towels, leaving only the necessary space exposed, and as a final step the iodin is washed off with 70 per cent alcohol. This precaution is taken to prevent the entrance of iodin into the peritoneal cavity, on the theory that the irritation it causes

is liable to increase intestinal distention after operation and to predispose to the formation of adhesions.

One half hour before the patient is taken to the etherizing room she is given 1/120 of atropin subcutaneously, in order to make the work of the anesthetist more easy. I have discarded the preoperative use of morphia for two reasons: in the first place, unless the patient's exact dose of morphia is known, she is apt to receive a slight over dose which may affect her respiration to some extent, making it so shallow that it may prove very difficult to produce satisfactory anesthesia; and second, because the action of morphia given shortly before delivery is supposed to render the baby apneic and interfere with its resuscitation. I am free to say that my personal experience does not bear out the latter theory, but the interference with the respiration of the mother may prove a very real disadvantage.

On awaking in the morning the patient is given an ether breakfast, consisting of a cup of black coffee or bouillon to prevent faintness, but nothing is given by mouth within two hours of the time of operation. The lower bowel is again emptied by a suds enema one hour before the time set for operation. Just before being placed on the etherizing table the patient empties her bladder spontaneously or is catheterized, the latter being preferable since it ensures complete emptying of the bladder and thus avoids the embarrassment to the operation which may be caused by a partly distended bladder, if a low incision is used.

When the operation is an emergency one on a patient in labor, the preparation is much more simple, but, as far as I can see, the results are equally good. An enema is given, unless the bowels have been thoroughly evacuated at the beginning of labor. The abdomen and pubic region are given a dry shave so as not to interfere with the penetration of the iodin, which is used to prepare the field of operation. The atropin is given and the bladder emptied, as in the ordinary preparation. The patient is then anesthetized and brought to the operating room. The preparation is completed by painting the abdomen with full strength iodin, which is washed off with 70 per cent alcohol after the field of operation has been surrounded with sterile towels.

A solution of 10 per cent picric acid in alcohol may be substituted for the iodin in both methods, and is said to have the advantage of not causing irritation of the peritoneum, if it is introduced into the abdominal cavity during operation. I have as yet no personal experience with its use.

Operator and Assistants.—In addition to the operator, three assistants are needed to make the operation go smoothly, an anesthetist, an

operative assistant, and a second assistant or nurse to handle instruments and sutures. In addition, a competent person should be delegated to receive and resuscitate the baby, so that the operator's attention will not be diverted from the operation by anxiety for the baby.

The operator and all assistants who take part in the operation should wear caps, face masks and sterile gowns, so that all possible means of wound infection may be avoided, and after a thorough preparation of the hands, should don sterilized rubber gloves. The method of hand preparation varies with the preferences of the individual surgeon, but the use of rubber gloves is obligatory in modern surgery, and the hands must be carefully prepared by some method before the gloves are put on, since otherwise an accidental puncture of the gloves may result in infection.

Instruments and Sutures.—For a conservative cesarean section a very simple layout of instruments is all that is necessary, but since in any case it may prove necessary to remove the uterus for hemorrhage or other cause, the layout should include all necessary instruments for that operation. The following instruments are required: 2 scalpels, 2-4 pairs of scissors, 2 pairs of dissecting forceps, 12 short and 6 long artery forceps, 1 ligature carrier or Cleveland needle, abdominal retractors, 1 needle holder, and such needles as the operator prefers, both curved and straight with cutting and round points.

The suture material varies with the preferences of the individual surgeon. In the early days of the cesarean operation the uterus was closed by means of a fine silver wire suture, which in time was succeeded by silk and later by linen thread sutures. In later years the use of non-absorbable sutures in the uterus has largely been given up for various reasons, but particularly because, whenever infection of the uterine wound occurred, a long and painful convalescence ensued, accompanied by the discharge of suture material from the wound over a long period of time. This disadvantage is not limited to the immediate period of convalescence, since in two of my own cases the wounds which had apparently healed properly broke down after an interval of six months in one case and a year in the other, and did not heal until several sutures had been discharged. At the present time some form of absorbable material is ordinarily employed for the buried sutures, chromicized or iodized catgut or kangaroo tendon, according to the preferences of the operator. My own preference is for chromicized catgut, which can be boiled with the instruments as a final precaution, using no. 2 catgut in the uterine musculature and in the fascia of the abdominal wall, and no. 1 for the peritoneum. It must be remembered that chromicized catgut, even when

tied in a square knot as done with silk or linen thread, is liable to slip and become untied and a third knot should be tied in every important suture. Silkworm gut is the most reliable material for suturing the skin in the final closure of the abdominal wall.

The usual sterile dressings should be provided and large gauze handkerchiefs for use in the operation. No small sponges should be allowed in the operation, owing to the fact that they are easily lost in the abdominal cavity, to make trouble later. I personally prefer gauze strips, of from one to two yards in length, which can be used for either sponging or packing as desired, and are so large that there is little danger that one can be left behind at operation. That this danger is not an imaginary one every surgeon knows, although he expects to be immune himself. I have personally removed four sponges after cesarean section by other operators and know of several other instances.

In the Boston Lying-in Hospital, where the operative assistants, both interns and nurses, are constantly changing, the following routine has been adopted, which can be carried out easily in any operating room and which seems to me to leave little to chance. The gauze strips are numbered serially from one to twenty-five, which should be more than are needed in any cesarean section, twelve to fifteen being usually the maximum. In the operating room we have a wooden frame with hooks numbered to correspond with the numbered sponges. When the dry goods are opened the numbers on the tags sewed to the sponges are noted. As each sponge is discarded during the operation it is hung on the hook corresponding to its number. Before the abdomen is closed the numbers of the sponges on the frame and clean sponges on the nurse's table are checked up and the operator is responsible for any sponge not thus accounted for. At the end of the operation all sponges, used and clean, are hung on their proper hooks and the operator can see at a glance that none are missing.

In operations in private houses the nurse and assistant each count the sponges twice before and after operation, while the assistant and myself count the sponges which are placed in the abdomen for any purpose, both when they are put in and when they are removed. Before the abdomen is closed and after the operation is completed the sponges are again counted, and the count must agree with the count at the beginning of operation before the patient is put to bed.

It would seem as if there should be no necessity to insist on careful precautions in a matter of such great importance to both operator and patient, but the number of cases in which sponges are left in the abdomen after operation is so great that it is evident that many surgeons are

either careless themselves or trust to some one else who is careless, with unfortunate results for the patient and occasionally for the surgeon, since he alone must bear the responsibility for such neglect.

Choice of Anesthetic.—All of the recognized methods of anesthesia have been used for cesarean section, and each has its advantages or disadvantages in the different types of case for which cesarean section may be indicated.

General Anesthesia.—In patients who are normal surgical risks the use of a general anesthetic is the most satisfactory method for the operator, since it ensures perfect quiet and relaxation on the part of the patient and does away with any fear of causing undue suffering in the manipulation of the uterus.

Chloroform is commonly used in some localities, but in my opinion has no advantages over ether except in rare cases, and sometimes results fatally for the patient. The immedate dangers of chloroform anesthesia are too well known to require discussion here, but there is another source of danger in these cases, i.e., delayed chloroform poisoning. A certain number of cases have been reported after profound chloroform anesthesia, in which the patient has died a few days later with symptoms analogous to those of toxemia of pregnancy, and at autopsy changes in the liver have been demonstrated, apparently due to the effect of the chloroform. I believe it to be, therefore, an unsafe anesthetic in cesarean section for this reason, in spite of the fact that pregnant women are popularly supposed to be immune to the ordinary dangers arising from its use. The liver in pregnancy is notoriously liable to degeneration, and no drug which is known to cause liver damage under any circumstances should be employed, unless other conditions are present in the given case which may render the advantages from the use of chloroform greater than the dangers its use entails.

Nitrous oxid gas in combination with oxygen has the advantage of producing anesthesia rapidly and of being eliminated quickly. It is an easy method of anesthesia for the average patient and its use is not usually followed by vomiting, although in susceptible patients vomiting may be severe and prolonged. This method of anesthesia is not, however, suited for prolonged operations, unless the anesthetist has had special training in its use, and the evanescent anesthesia it produces may not give the relaxation necessary for a prolonged operation. If its use is preceded by morphia and scopolamin it may prove more satisfactory, but the baby is apt to be apneic following the administration of morphia shortly before delivery and to require careful resuscitation. Its employment is particularly to be advised in patients who are not considered

good subjects for ether on account of irritative conditions of the air passages, in cases in which the use of a general anesthetic is deemed advisable. Its greatest usefulness, however, is as a preliminary to the use of ether to produce full anesthesia, since it shortens the preliminary stages and does away with much of the discomfort which anesthesia produced by ether alone entails.

Gas-oxygen anesthesia should, in my opinion, never be used on patients whose blood pressure is markedly elevated. The stage of anesthesia is preceded by a short stage of asphyxia, which produces a sudden rise in pressure and throws a sudden burden on the heart, which is already working hard. Most of the fatalities reported from this method of anesthesia have occurred in cases of high blood pressure, acute cardiac dilatation developing as a result of the sudden increase of pressure. This renders it an unfit anesthetic for use in the toxemia of pregnancy or chronic nephritis. For the same reason it should not be employed as a preliminary to ether in patients who have serious cardiac lesions, especially if the myocardium is believed to be diseased.

Ether is the best of the general anesthetics and is practically safe for all normal patients. In irritative conditions of the lungs, in patients with cardiac decompensation, and in diabetics, its use is attended by such danger that other methods of producing anesthesia are to be preferred. On normal women, especially when preceded by gas, its use is not attended by risk or great discomfort. More or less ether passes through the placenta to the fetus and at times seems to be a factor in rendering resuscitation difficult, but this effect is transient and not productive of harm.

Local Anesthesia.—In patients who are not good risks for a general anesthetic, i.e., patients with cardiac decompensation, diabetes, pneumonia, etc., who require cesarean section, anesthesia sufficient for operation can be produced by novocain, either injected locally into the abdominal wall, or used by the paravertebral or intraspinous methods.

After trying the various methods I am convinced that injection of ½ per cent novocain into the abdominal walls, infiltrating all layers thoroughly and waiting a reasonable time—ten to fifteen minutes after the injection is made—before beginning the operation, will prove more satisfactory than paravertebral or spinal anesthesia. In a somewhat limited experience by this method I have found satisfactory relaxation of the abdominal walls. If the parietal peritoneum is well injected, the abdominal incision can be made practically without causing pain or even marked discomfort. The uterine peritoneum is almost non-sensitive and can be incised without being infiltrated with novocain almost with-

out sensation. The uterine musculature itself also seems to be insensitive and can be incised without being anesthetized. If a fairly low abdominal incision is made, so that the uterus can be sutured *in situ* without being dragged out of the incision, closure of the wound, including the peritoneal coat, is practically painless. The anesthesia of the abdominal wall lasts for a long enough time to render closure a simple matter without a second infiltration. If, however, there are peritoneal adhesions present from old inflammations or operations, any manipulation of them is exceedingly painful and the attempt to infiltrate them, if they are to be ligated and divided, causes marked pain, although with care it can be accomplished. Although the uterus is practically without sensation, any attempt to manipulate the broad ligaments or tubes, if it is desired to sterilize the patient, causes considerable pain, either when a ligature is passed through the broad ligament or when it is tightened around the tube, but the tubes can be excised from the uterus without causing undue suffering. Hysterectomy under local anesthesia would probably be so painful as to be practically impossible without infiltration of the broad ligaments with the novocain solution, but simple excision of the tubes from the uterine cornua can be readily accomplished.

Paravertebral anesthesia, or blocking of the posterior branches of the spinal nerves at their points of exit from the spinal foramina, is a satisfactory method of producing anesthesia from the surgeon's standpoint. It labors under the disadvantages of being a long drawn out process, requiring nearly two hours to produce satisfactory anesthesia for operation, and furthermore can only be done by an expert who has had special training in the technic. There are very few of these trained experts, especially in this country, and the length of time necessary to produce anesthesia renders it inapplicable to emergency cases.

Spinal anesthesia is a satisfactory method as far as producing good anesthesia for the operation. The after effects, headache, vomiting, etc., are sometimes very unpleasant, and except in cases in which extensive separation of adhesions or hysterectomy may be necessary, I prefer the local anesthesia as the more satisfactory method in the comparatively few cases where a general anesthetic cannot be given.

The success of either local or paravertebral anesthesia will be increased, if the patient is carefully prepared for operation by the use of the morphin-scopolamin sequence. Except in emergency cases, the patient should be given hypodermically 1/6 grain of morphia and 1/200 grain of scopolamin from one and one half to two hours before the time set for operation. The scopolamin, but not the morphia, should be repeated at intervals of forty-five minutes, more than two additional

doses being seldom, if ever, necessary to make even the most nervous patient quiet and so drowsy that she drops off to sleep on being left to herself. As an added precaution, her ears are plugged with cotton and her eyes are bandaged just before she is brought to the operating room. When a patient is so prepared, it is often possible to anesthetize the abdominal wall without rousing her to consciousness, except very temporarily, and the operation can be performed with a minimum of suffering, if the operator is careful to wait a proper length of time for the novocain anesthesia to develop, and then is careful to be gentle in his intra-abdominal manipulations, particularly avoiding traction on the pelvic peritoneum and in handling the broad ligaments.

The recovery from the immediate effects of the operation is noticeably painless and free from shock, even in hypersensitive patients, and there is no tendency to postoperative vomiting. This method is, in my opinion, particularly suited to cardiac patients in whom more or less serious decompensation is present, although some authorities consider the use of morphin and scopolamin dangerous in such circumstances. In my experience, however, the method has been a success, and there have been no uncomfortable symptoms in the small number of cases in which I have employed it.

CHAPTER VIII

OPERATION

The Classical Cesarean Section—Use of Oxytocics—Abdominal Incision; High; Low—Technic of Operation—Question of Haste—Protection of Peritoneal Cavity—Uterine Incision—Extraction of Child and Placenta—Suture of Uterine Incision—Peritoneal Toilet—Precautions Against Postpartum Hemorrhage—Closure of Abdominal Wound—Transverse Fundal Incision of Uterus; Advantages; Disadvantages—Gastric Lavage to Diminish Postoperative Vomiting—Bibliography.

In the ordinary case the conservative, or classical, cesarean section is, from a purely technical standpoint, a simple, surgical procedure. The abdomen is opened in the mid line, or slightly to one side of it; the uterus is opened in the median line; the child and placenta are extracted; the uterus is sutured and replaced in the abdominal cavity, and the abdomen is closed. It is a simple operation in the absence of complications, usually to be completed, in the ordinary case, inside of half an hour. The steps of the operation, however, must be described more in detail, since certain points in technic may render the results more satisfactory.

It is customary to administer to the patient, shortly before the incision is made in the uterus, a hypodermic injection of some reliable preparation of ergot, or pituitary extract, or both, to aid in securing proper contraction and retraction of the uterus after the child is delivered, for the purpose of preventing or limiting hemorrhage, which may occasionally be very severe in a relaxed condition of the organ.

The time and method of administration varies with different operators and should vary with different patients. A combination of ergot and pituitary extract is more efficient than either alone, since they differ markedly in the rapidity and duration of their action. Ergot is a relatively slow acting drug, and its effect is prolonged, whereas the pituitary extract acts quickly and its action is comparatively transient, and if used alone, postpartum hemorrhage may follow when the effect of the drug wears off.

In a patient who is not in labor and in whom the contraction of the uterus is apt to be rather slow it is my custom to give one ampul of some reliable preparation of aseptic ergot deep into the muscles of the

thigh shortly after the anesthetic is started, timing it so that practically ten minutes will elapse from the time of administration to the beginning of operation, and to inject one ampul of pituitary extract into the uterine wall just before it is incised. A second ampul of ergot is given before the patient is returned to bed as a matter of precaution, to ensure contraction of the uterus until thrombosis has taken place in the uterine sinuses and the danger of postpartum hemorrhage is past.

In patients who have had previous abdominal operations and in whom there may be adhesions, the separation of which may require some time before the uterus can be opened, I prefer to give the ergot just before beginning the abdominal incision, to avoid any possibility that by an unusually prompt action it may induce spasm of the uterus prematurely, and thus interfere with the placental interchange and produce a degree of asphyxia in the child which may materially interfere with its resuscitation. This is a point of some practical importance, since it is a matter of common experience that an unusually prompt action from either ergot or pituitary extract may cause such a severe contraction of the uterine muscle as to render extraction of the child and placenta difficult, unless a much more extensive incision is made than is ordinarily necessary for delivery; and it is conceivable in such a case that, if much time were wasted in freeing adhesions, death of the child might occur from interference with the placental circulation.

If the patient is in labor at the time of operation, the uterus will probably contract and retract in a satisfactory manner without the aid of oxytocic drugs, and the administration of the ergot, being simply a precaution to prevent postpartum hemorrhage, may be delayed until the abdomen is opened, since if it should happen to act unusually promptly on an irritable uterus, it may render the extraction of the child difficult; and it is conceivable that sufficient interference with the placental circulation might be induced by too rapid action to turn the scale against a child which had already suffered from a more or less prolonged labor.

Some operators prefer to depend on pituitary extract alone, injecting it directly into the uterine muscle just before the uterine incision is made. Administered in this way, its action is prompt and satisfactory, but since its action is relatively transient, I feel that its use should be reinforced by the intramuscular injection of ergot, to prevent possible relaxation of the uterus with postpartum hemorrhage.

Incision of the Abdomen.—There has been much discussion in the last few years as to whether the abdominal incision should be made above or below the umbilicus, but either incision is perfectly satisfactory in the average patient. In certain types of patient, however, the location of

the incision is of importance, because of various conditions which may be present, and these conditions require some discussion. If an extraperitoneal operation is contemplated, so that the uterine incision will be in the lower segment, a low incision must be made, but in the average clean case the location of the incision is practically immaterial.

In the early days of cesarean section a long incision was employed, reaching from the ensiform to the pubes, and the uterus was delivered from the abdominal cavity before being incised, the peritoneal cavity being carefully protected by gauze packing to prevent contamination by blood and liquor when the uterus was opened. The long incision has been practically abandoned at the present time in favor of an incision just long enough to permit the easy delivery of the child, and it is customary to incise the uterus *in situ,* except in cases believed to be infected. In this case, however, a sufficiently long incision should be used to permit the delivery of the uterus before it is opened, and the peritoneal cavity should be carefully protected by gauze packing. Furthermore, in these cases the operation is best completed by amputation of the uterus, instead of returning it to the abdominal cavity to act as a source of infection and general peritonitis.

High Incision.—The advocates of the high incision urge that the incision be entirely above the umbilicus, claiming that adhesions between the uterine and abdominal incisions are thus avoided, since the empty uterus promptly retracts below the level of the umbilicus, and that hernia in a scar in this region very seldom occurs and if it does occur causes little or no inconvenience to the patient. The disadvantages of the high incision lie in the fact that, if it becomes necessary to remove the uterus for any reason which develops during operation, the incision must be widely extended; and it also seems to me that dilatation of the stomach occurs somewhat more often as a postoperative complication, if the high incision is employed. A relatively high incision, however, has a very distinct advantage in patients with fat abdominal walls, since the fat layer is much thinner above than below the umbilicus and the operation is thus made more easy; but in the average case I believe that the location of the incision is not a matter of great moment.

Low Incision.—The advocates of the low incision simply say that it has proved satisfactory in their hands, that the uterus has not become adherent to the scar in clean cases, that hernia in the scar does not occur in their experience, if the abdominal wall is properly sutured, and that from their standpoint the high incision offers no advantages.

I personally prefer, in clean cases, an incision with the umbilicus at about the mid point, usually to the right of the mid line, since the uterus

is twisted to the right in about 80 per cent of all cases, and this incision is thus, in the majority of cases, more nearly over the mid line of the uterus where the uterine incision is best made. An incision at this level removes the uterine incision from the relatively inactive lower segment and the bladder attachment, which I believe to be an advantage, and the incision is high enough to prevent adhesion of the uterus to the wound.

Conduct of the Operation.—There seems to be something about cesarean section which induces a large proportion of operators to hurry as no other operation does, and the operation often becomes a mad scramble in the attempt to deliver the baby in the shortest possible time. I know of at least two instances in which the baby has been cut during the primary skin incision, which is unpardonable. The operator must remember that although the intestines lie behind and to the sides of the uterus in practically all cases in which there are no adhesions from previous operations or inflammatory conditions, sudden straining on the patient's part at the time of the incision of the abdomen may force a loop of intestine in front of the uterus into a position where it may be injured, if the abdominal incision is rashly made.

In patients who have had previous abdominal operations the danger is a very real one, since it is not at all uncommon to find a loop of intestine adherent to the old incision or to the uterine scar in a position where it might very readily be injured if the abdominal wall is opened carelessly, and though I do not know of any case in which the intestine has been injured, I have seen several cases in which it might well have been, except for care exercised by the operator. There is no more reason for haste in cesarean section than in other laparotomies, and the abdominal wall should be opened deliberately by an incision approximately six inches in length. The uterus will then lie exposed directly under the incision. Since a certain degree of torsion of the uterus is usually present, the uterus should be palpated to ascertain its position as well as the position of the child, and if much lateral torsion exists, it should be brought into an approximately normal position before being opened, inasmuch as if the uterine incision is made in the region of one of the cornua, more hemorrhage is to be expected on account of the large vessels in that region than if it is opened close to the median line.

Before incising the uterus some operators prefer to protect the peritoneal cavity by gauze packs moistened with normal saline solution. In perfectly clean cases this is unnecessary, since the uterine contents are sterile, except possibly in cases of toxemia and eclampsia, in which recent observations tend to show a blood infection in a considerable number of cases. In doubtful cases the peritoneal cavity should always

be protected before the uterus is opened. Usually, however, all that is necessary for protection of the peritoneum is to compress the abdominal walls against the uterus, so that most of the liquor and blood will escape externally, the remainder being removed at the end of operation, when a careful peritoneal toilet should be performed in any case. If the patient is believed to be infected, the abdominal incision should be of sufficient length to permit the delivery of the unopened uterus, and the peritoneal cavity should be carefully protected by packing before the uterus is incised. In such a case the greater part of the incision should be below the umbilicus, to permit of easy access to the broad ligaments, etc., in case it is decided to complete the operation by hysterectomy.

Uterine Incision.—A longitudinal incision is now made through the uterine wall in the median line, a few centimeters in length, down to the membranes or placenta, if the latter is situated on the anterior wall, and rapidly enlarged with scissors to a length sufficient for the easy extraction of the child. If the incision is not long enough, it will tear at one or both ends, leaving a ragged wound, the efficient suture of which may prove a matter of considerable difficulty. In a considerable proportion of cases the placenta will be found lying under the uterine incision, but this is of no moment except that the immediate loss of blood is greater than if the placenta lies on the posterior wall of the uterus, on account of the increased vascularity of the uterine wall in the region of the placenta. If the placenta lies under the incision it should be pushed to one side or perforated and the hand passed rapidly down to the feet of the child, which have been previously located, and one or both feet grasped and the child rapidly extracted. If the placenta is not under the incision, the membranes will bulge through the wound. They should be ruptured and the child rapidly extracted. The only period of danger for the child is in the period between the beginning of the uterine incision and the extraction of the child, especially in cases in which extensive separation of the placenta from the uterine wall is necessary before the hand can be introduced into the uterine cavity; and this is the only portion of the operation in which rapid manipulation is of advantage. The entire procedure of extraction of the child should only take a few seconds, however, and there should be little or no danger to a child whose condition has not been compromised before the operation is undertaken, unless the attempt is made to extract it through too small an opening in the uterine wall. It is, therefore, important that the uterine incision should be sufficiently long to permit easy extraction and avoid any possible delay.

As soon as the child is delivered the cord should be clamped in two

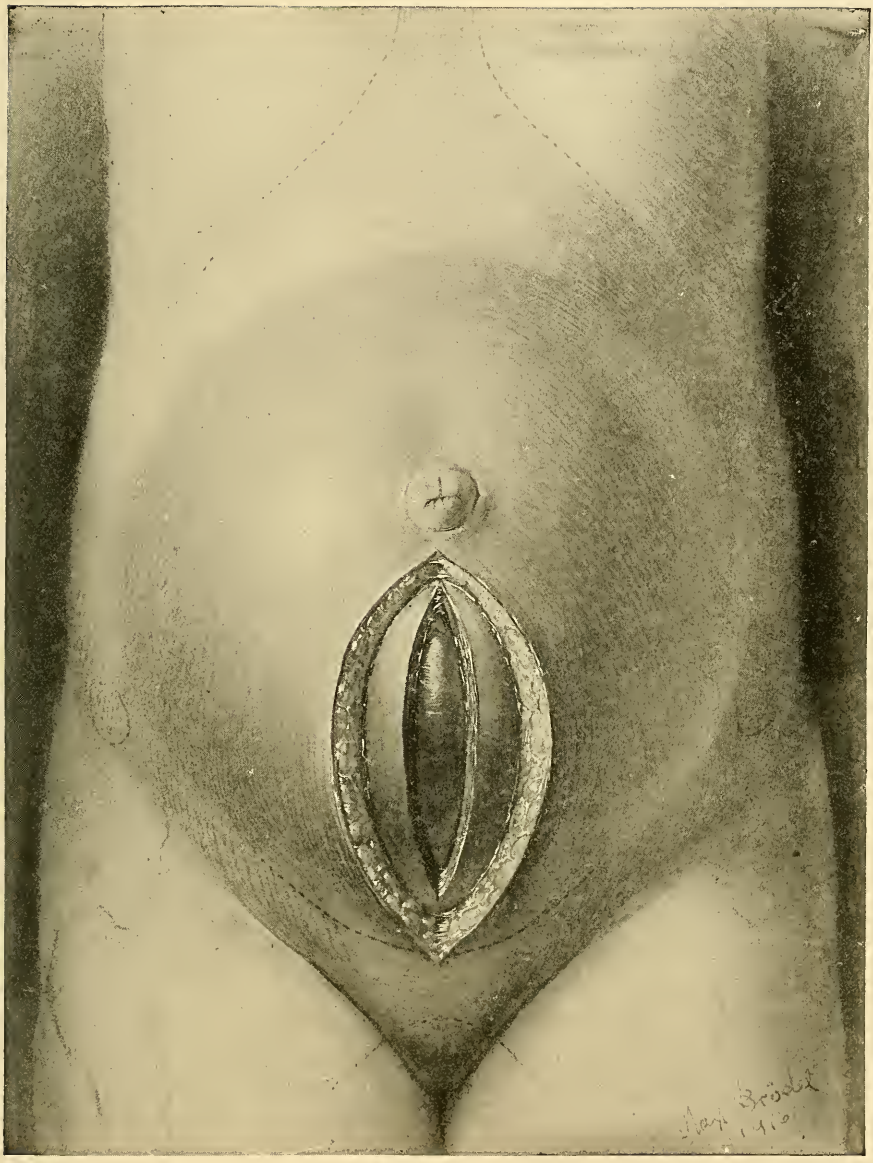

FIG. 29.—CONSERVATIVE CESAREAN SECTION.
Uterine incision: fetal membranes visible.

places and cut between the clamps. The child should then be handed promptly to the assistant responsible for its resuscitation, and the operator can then devote his whole attention to the completion of the operation. The uterus should now be delivered through the abdominal wound and a

gauze pack or folded towel inserted behind it, to prevent any further peritoneal contamination. There will always be a certain amount of bleeding from the uterine incision, and sometimes large sinuses will be seen bleeding freely, but as soon as the uterus begins to contract and retract the bleeding will be largely controlled, and in my experience it is seldom or never necessary to take any active steps to control the hemorrhage. In the early days of the operation it was considered ad-

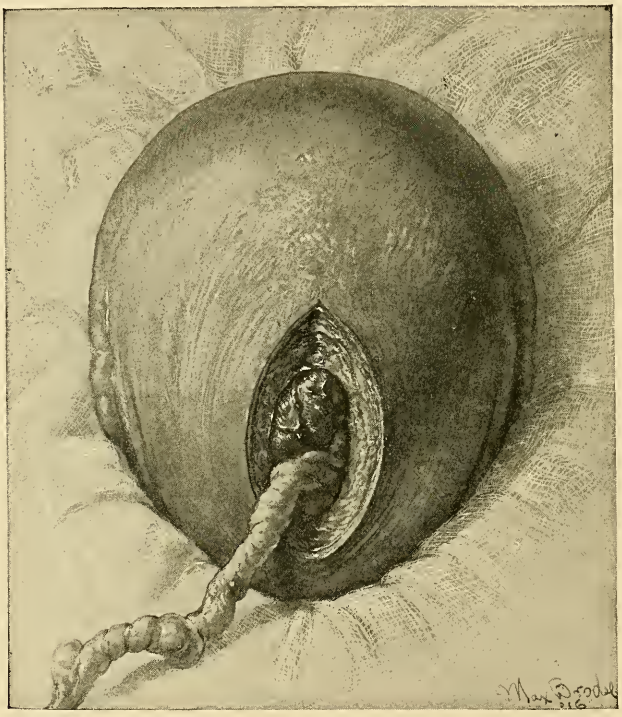

FIG. 30.—CONSERVATIVE CESAREAN SECTION.

Uterus, emptied of fetus, delivered through abdominal wall and lying upon gauze: placenta undelivered.

visable to compress the lower segment of the uterus by an elastic tourniquet, but further experience has shown this to be not only unnecessary but even positively harmful, though some operators still employ compression of the cervix made by the hands of an assistant in the broad ligament regions, with the idea that if the uterine arteries are compressed in this way, there will be little or no hemorrhage from the uterine incision during the process of suture, and that all danger from hemorrhage ceases as soon as the uterine wound is closed. This procedure has the disadvantage of being unnecessary in most cases and of

subjecting the pelvic peritoneum to an undue amount of handling, which can be avoided in all but the occasional case, and the less the peritoneum is manipulated the more comfortable the convalescence. Furthermore, when the lower segment of the uterus is tightly compressed, whether by the hands of an assistant or by a rubber tourniquet, it seems to partially paralyze the uterine muscle and temporarily diminish its contractility, thus interfering with its normal contraction and retraction, at times to a degree which definitely predisposes to postpartum hemorrhage, ultimately increasing instead of lessening the amount of blood lost.

As soon as the uterus is delivered the placenta and membranes should be removed, great care being taken to detach and remove all of the membranes, particularly those in the lower uterine segment, the retention of which may interfere with proper drainage of the lochia later by acting as a plug, which obstructs the cervical canal and thus predisposes to retention of lochia, at times to a degree which may give rise to uncomfortable symptoms and necessitate active treatment.

Suture of the Uterine Incision.—The uterine wound should now be sutured according to the technic of the individual operator, the points to be observed being complete closure of the wound in the uterine musculature and careful suture of the peritoneum over it. To accomplish this I prefer interrupted chromic catgut sutures about one centimeter apart which include the whole thickness of the uterine wall from the peritoneum to, but not including, the decidual lining. These sutures are tied only sufficiently tightly to compress the included muscle without causing necrosis. Coaptation sutures should be placed superficially, if necessary, to secure proper approximation of the muscle. I believe it to be important that the stitches placed at the upper and lower angles of the wound should be so placed as to include any sinuses which may enter the angles of the wound, since if this precaution is neglected, troublesome bleeding may occur. The uterine peritoneum is then closed over the wound with a continuous suture. Any packing which has been inserted into the abdominal cavity is removed and the peritoneal cavity carefully cleansed of any liquor or blood which may have escaped into it, and the abdominal wall closed in layers.

Transverse Incision of the Fundus.—In 1897 Fritsch suggested that a transverse fundal incision be substituted for the ordinary longitudinal median incision of the uterus, on the theory that, since the course of the blood vessels in that region is largely transverse, large vessels are less likely to be injured and hemorrhage will be minimized. Many operators have followed his lead, but the results, though excellent, have

not proved to be any better than those obtained by the ordinary incision, and to-day it is practically abandoned.

It has been urged that, if the incision is made in this region, the adhesions between the uterine and abdominal incisions are eliminated. This is undoubtedly true, but the fact that the liability to adhesion between intestine or omentum and the uterine incision is much increased

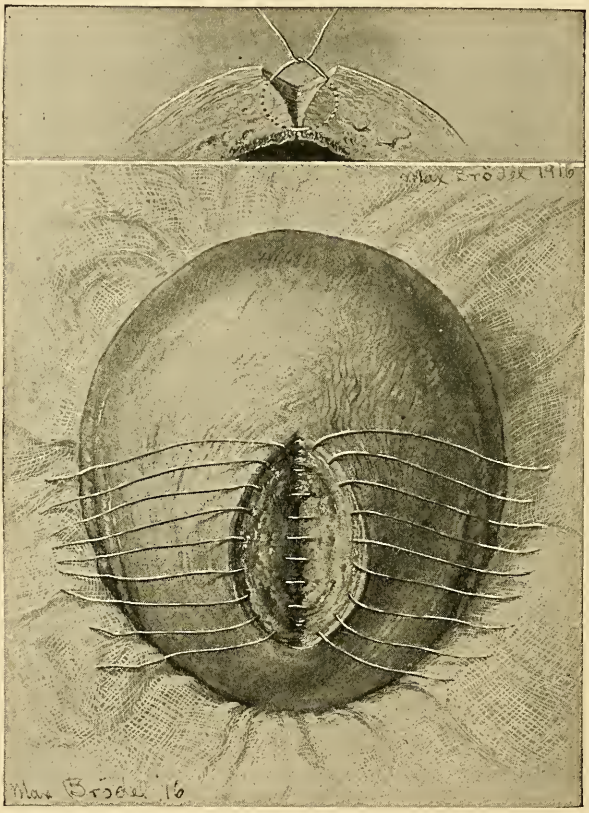

FIG. 31.—CONSERVATIVE CESAREAN SECTION.
Placenta delivered and deep sutures inserted.

renders this advantage of distinctly minor importance. Furthermore, it is evident that, in case of infection of the uterine incision, the peritoneal cavity is to a certain extent protected by the fact that the uterine incision may become adherent to the abdominal wall, and if an abscess forms it can be drained with ease through the abdominal incision, or an extension of it, whereas, if the fundal incision were employed, the septic material would escape directly into the general peritoneal cavity,

causing peritonitis and death. In perfectly clean cases this risk is a small one, but when there is the slightest doubt as to whether infection is present or not, the transverse incision is absolutely contra-indicated.

The only real advantage of this incision would seem to be in cases in which it is proposed to sterilize the patient by excision of the tubes from the uterine cornua, which can be accomplished by a single incision in this location. The advantages gained by this method are, however,

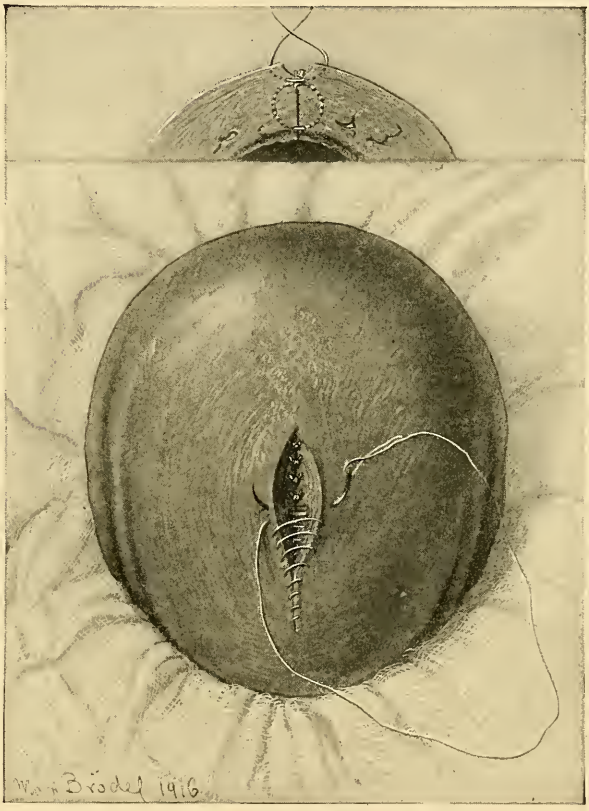

FIG. 32.—CONSERVATIVE CESAREAN SECTION.

Deep sutures buried: external muscle and peritoneum joined by continuous suture.

rather apparent than real, whether as regards saving of time or ease of performance.

Within the last few years certain operators have advocated that the uterine incision should be made in the lower uterine segment, even in absolutely clean cases, the bladder being separated from the anterior surface of the uterus to expose the field of operation and replaced after the suture of the uterine wound is completed. The advantages claimed

are, that the uterine incision, being walled off from the peritoneal cavity, convalescence is smoother and more comfortable for the patient in clean cases, and that if infection of the uterine wound occurs, it will remain extraperitoneal and, therefore, be less serious than if the wound connects directly with the peritoneal cavity. It is also claimed that the wound, being in the passive portion of the uterus, is less affected by the alternating periods of contraction and relaxation which occur in the active portion of the uterus and, therefore, will heal more satisfactorily and ultimately give a firmer scar, which will be less liable to rupture in future pregnancies.

The advantages to be gained in clean cases at the time of election from this modification seem to me to be theoretical rather than real, with the possible exception that in some cases the convalescence will be made somewhat smoother, and the technic of operation is distinctly more difficult. Furthermore, troublesome bleeding sometimes occurs from injury to veins in this region and its control may prove a matter of considerable difficulty.

There is no question but that, if infection of the uterine wound occurs, a localized process between the uterus and bladder will be less immediately dangerous to the patient than if the infected uterine wound communicates directly with the general peritoneal cavity, but this alternative does not often arise in cases operated on at the time of election, and, in my opinion, this operation should be reserved for patients to whom the classical cesarean section seems to offer undue risks, and yet for whom cesarean section by some method seems to be definitely indicated. This group includes patients who have been subjected to a prolonged labor and those who have been repeatedly examined vaginally, even under good asepsis. It does not include, however, those who are frankly infected, for whom cesarean section should be avoided if possible, and when it seems unavoidable should be followed by hysterectomy.

It has been advised by some operators that the cervix should be dilated from above to ensure free drainage for the lochia before the uterine wound is closed, but this is unnecessary in most cases, and unless the vagina has been surgically prepared, is a possible source of danger to the patient. Furthermore efficient cervical dilatation will often prove difficult and may be attended by so much trauma as to offer a portal for infection and thus increase the danger to the patient. Vaginal preparation should always be carried out in cases that have been long in labor or that have had vaginal interference before the abdominal operation is undertaken, but is not otherwise necessary, and in these cases I believe that it is a wise precaution to irrigate the lower portion

of the uterine cavity with 70 per cent. alcohol, which is allowed to drain away through the cervix.

The vaginal preparation should consist of a thorough scrubbing with sterile soap and water followed by alcohol, as for any vaginal operation. Douching with antiseptic solutions is an unreliable method of securing vaginal asepsis, and only a thorough scrub under anesthesia is to be relied on.

Before the abdominal wall is closed the lower uterine segment should be palpated, and if it is found filled with clots, as is often the case, they should be milked out through the cervix. The uterus should be watched carefully and kneaded from time to time, to ensure efficient contraction as a guarantee against hemorrhage, and the abdomen should not be closed until satisfactory contraction has been obtained, which may in some cases require some little delay. Most of the cases of serious post-partum bleeding have occurred in cases in which the condition of the uterus was not carefully ascertained before the abdomen was closed, and the uterus should always be palpated to learn its condition just before the peritoneal closure is completed. The abdominal wall is closed in layers, the skin being carefully approximated. The method of closure depends on the preferences of the individual operator, any carefully done layer suture being efficient.

While the final layer of sutures is being placed in the abdominal wall I always adopt the precaution of washing out the patient's stomach in the hope of removing any ether which may have been secreted into the stomach during operation, which may act as an irritant and increase the tendency to postoperative vomiting. The results of this treatment seem to warrant its continuance, as few of my patients are troubled with vomiting during the twenty-four hours immediately after operation, and the avoidance of retching makes them much more comfortable. There is a small proportion, however, in whom nothing seems to affect the postoperative vomiting. Many of these patients vomit excessively after gas-oxygen anesthesia, so that it is apparently some condition of the gastro-intestinal tract, rather than the anesthetic, which is responsible.

After the abdominal wound is closed the dressing is applied and the patient put to bed, usually being given one sixth, or a quarter of a grain of morphia as soon as she becomes restless and begins to show signs of recovery from anesthesia. Unless the patient gives a history of uncomfortable reaction to morphia in the past, the dosage is repeated as often as may be necessary for the next twenty-four hours, bearing the fact in mind that if severe postoperative vomiting develops morphia may be a causative factor in susceptible individuals.

The technic of supravaginal hysterectomy and extraperitoneal cesarean section will be considered in separate chapters.

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CHAPTER IX

AFTER CARE

Relief of Pain—Thirst—Diet—Care of Bladder—Bowels—Intestinal Distention—Lochia—Treatment of Returned Lochia—Antiseptic Precautions—Vaginal Douches Contra-indicated—Lactation and Nursing—Temperature—Pulse—Bibliography.

The after care of the patient who has had a cesarean operation is a combination of the care of an ordinary laparotomy, plus the usual precautions carried out after a normal delivery. There are certain complications which are apt to arise and which must be guarded against or watched for, since they may cause considerable anxiety and, if neglected, may prove serious. This is particularly true in patients who have been in labor for any length of time and have been subjected to frequent examination, but the simplest case may give rise to symptoms which will cause serious anxiety. As a general rule the recovery from the anesthetic is prompt and attended by little or no vomiting, if the stomach has been washed out before the patient leaves the table; in fact, as in other obstetric operations, there would seem to be less nausea and vomiting than in other cases where ether is given to full anesthesia.

Pain.—Many patients suffer severely from pain during the first few hours after operation, and repeated doses of morphia may be required to keep the patient quiet and fairly comfortable, and may be used without hesitation.

Two factors seem to enter into the causation of pain, the wound itself and the so-called after pains, due to repeated contraction and relaxation of the uterus. The pain from the wound is ordinarily easily controlled, but in the occasional patient, usually a multipara, the after pains cause marked discomfort, and the patient complains bitterly. In one of my patients recurrent uterine contractions at short intervals caused so much suffering as to render necessary the administration of one and one fourth grains of morphia in divided doses before any appreciable relief was obtained. In these cases repeated doses of morphia at short intervals may be required to make the patient comfortable, and should be given, if necessary, during the first twenty-four hours. After this time morphia is seldom necessary, and any discomfort which remains can usually be controlled by codeia, which is less likely to cause intestinal paralysis, and

is to be preferred. In the comparatively rare case in which severe and prolonged postoperative vomiting occurs the possibility that the morphia used to control pain and discomfort may be a causative factor should be considered, and if codeia combined with the use of aspirin by rectum proves inadequate, opium suppositories may prove effective, both in relieving the pain and controlling the vomiting.

Thirst.—Most patients complain of thirst after any abdominal operation. This can be relieved to some extent by the rectal administration of eight ounces of tap water every three or four hours, to which may be added one drachm of bicarbonate of soda as a prophylaxis against any tendency to acidosis, which is a not uncommon sequel of anesthesia and may prove an annoying factor in causing postoperative vomiting. Since, however, there is usually little vomiting, if the stomach has been cleansed of any ether it may contain by lavage, the patients may be given water by mouth in moderate amounts as soon as they recover from the immediate effects of the anesthetic. If vomiting occurs, water should be temporarily withheld. It is unwise to give large amounts at any one time in the first forty-eight hours, owing to the fact that large amounts of liquids by mouth apparently favor acute dilatation of the stomach, which seems to be a relatively common complication after cesarean section, especially in patients who suffer severely from hyperacidity and other digestive disturbances during pregnancy, or who, when not pregnant, show ptosis of the abdominal viscera.

Diet.—It is usually customary after an abdominal operation to begin feeding the patient small amounts of liquid nourishment as soon as the tendency to nausea has disappeared, gradually increasing the amount and not giving solid food until usually forty-eight hours or more have elapsed. My experience with cesarean section has convinced me that a copious supply of liquids by mouth shortly after operation tends to increase the tendency to gastric dilatation, and it is now my custom to begin with small amounts of orange juice and albumen, or milk and lime water, in not more than one ounce doses at hourly intervals to test the tolerance of the stomach. If after two or three doses the stomach seems to be tolerant I then shift at once to a semisolid diet, milk toast, junket, cereals, etc., given in small amounts at relatively frequent intervals, and believe that if the patient is treated in this way the danger of acute dilatation of the stomach is much diminished, though not entirely abolished, since in some patients general ptosis of the abdominal organs is present and the sudden relief of pressure, incident to the emptying of the uterus, allows the stomach to prolapse, and a kink being formed in the duodenum, dilatation of the stomach results. If after the second

day the stomach is functioning satisfactorily, the patient is put on a full diet, on the theory that if a full diet is given as early as possible, not only will the patient recover her normal strength more quickly, but that lactation will be established earlier and more satisfactorily.

Bladder.—Some authorities recommend that the cesarean patient should be catheterized about twelve hours after operation and from then on at regular intervals for the next forty-eight hours. I consider this distinctly pernicious teaching on account of the danger of infection of the bladder. There is no reason for catheterization in the average case for practically twenty-four hours; unless the patient complains of discomfort. The average secretion of urine is not over twenty ounces during this period, and the great majority of cases will be able to urinate spontaneously, if properly encouraged, before the bladder becomes overdistended or marked discomfort develops. If discomfort develops, the patient should be promptly relieved, and if repeated catheterization is found necessary, urotropin gr. v-x should be given every four hours as a prophylactic against bladder infection as soon as the stomach is tolerant. It is also a wise precaution, when catheterization is necessary for a considerable period of time, to irrigate the bladder with 2 per cent boric acid solution at the time of catheterization once or twice a day. If the patient is treated in this way, cystitis will prove a rare complication, even though the use of the catheter proves necessary throughout the entire period of convalescence. If the patient is absolutely unable to void, routine catheterization every eight hours should be instituted, and if in spite of the precautions above noted, signs of bladder irritability develop, the instillation of one ounce of twenty-five per cent argyrol into the bladder will usually relieve the condition. If after a few days of catheterization the patient apparently regains control of the bladder, the routine use of the catheter should be omitted; but since in some cases the emptying of the bladder is only partial, sometimes only the overflow from a distended bladder being evacuated, it is well to catheterize once daily for a day or two, because if a considerable residual quantity of urine remains, infection is very apt to occur and a troublesome cystitis develop. This is particularly true when catheterization has been necessary for several days, and should be guarded against.

Bowels.—The bowels should be opened rather more promptly after cesarean section than after an ordinary laparotomy. This is advisable for two reasons: in the first place there is usually an accumulation of fecal matter in the intestines during the latter part of pregnancy, even though apparently satisfactory daily evacuations have taken place, and the patient will be rendered much more comfortable if the intestinal

tract is emptied early in the convalescence. In the second place the sudden alteration in intra-abdominal pressure in women who have been delivered by cesarean section, plus the tendency to intestinal stasis and gas formation in any patient who has had an abdominal operation, predisposes markedly to the accumulation of gas in the intestinal tract. In many cases the distention is extreme and the patients suffer marked discomfort, the abdomen being so distended as to be as large as before operation. In some cases, of course, this distention is a sign of peritoneal infection more or less severe, but in the majority of cases it is the result of natural mechanical conditions. Much can be done to lessen its severity, if steps are taken early in the convalescence. A very satisfactory method of opening the bowels is to give the patient one half ounce of milk of magnesia by mouth every four hours beginning as soon as any tendency to nausea has disappeared. This has a double advantage in being a mild laxative and in counteracting the hyperacidity of which many patients complain for the first few days after operation. In addition, the rectal tube is inserted at frequent intervals, and unless it causes severe discomfort it is left *in situ* for considerable periods of time, though not constantly, as some operators advise. If signs of distention occur early, or if the patient begins to pass gas through the tube, an ampul of pituitary extract is given hypodermically. This is followed in from one half to one hour by an enema consisting of two ounces of glycerin and two of water. This is retained in the rectum for about two hours, unless it acts promptly, when it is followed by an enema composed of either milk and molasses in equal parts of eight ounces each, or of epsom salts two ounces, glycerin two ounces, and water eight ounces, with two drachms of spirits of turpentine.

Not infrequently the first enema will give marked relief, much gas and more or less fecal matter being passed, but it is often necessary to give repeated enemata, in which case it is well to alternate between the two. If the patient is not in good condition and the use of an enema causes marked exhaustion, as is sometimes the case, the milk of magnesia, pituitary extract and the rectal tube will often prove sufficient, although in a few cases a stronger cathartic may prove necessary.

If there is no tendency to distention and if the patient is not uncomfortable, it is well to leave the bowels alone for forty-eight hours, when the use of enemata, with or without pituitary extract, will prove promptly successful in most cases. It is my feeling that after ordinary operations most surgeons attempt to open the bowels unnecessarily early, rather for the purpose of relieving their own minds than for the welfare of the patient, and the patient is often left nervously and physically exhausted

as the result of too active attempts to empty the lower bowel, when there is little or nothing there to be removed by enemata. After cesarean section, however, the tendency to abdominal distention from purely mechanical causes is so great that it is distinctly advisable to open the bowels early to prevent the discomfort incident to marked intestinal distention.

Lochia.—If the uterus and lower segment have been emptied of clots at the time of operation, the flowing will be no more profuse, and in many cases distinctly less profuse, then after a normal labor. If, however, the lower uterine segment has been left filled with clots at the end of operation, these clots must come away, and until the accumulation is evacuated the flowing will be more profuse than normal, and clots of considerable size may be passed.

It not infrequently happens, however, that retention of lochia occurs to a considerable degree just as after normal labor, becoming evident usually about the third or fourth day. This is theoretically more likely to happen when the operation has been performed on patients at the time of election, before any dilatation of the cervix has taken place, but in my experience cervical dilatation seems to make little difference, and I have seen a number of cases of retention of lochia in patients who were well advanced in labor at the time of operation. Placing the patient in Fowler's position to favor drainage, an ice bag over the uterus to stimulate contraction, and the administration of small doses of fluid extract of ergot by mouth (unless it causes nausea) will usually prove promptly successful in relieving the retention. If these measures do not succeed promptly, and especially if the patient begins to have an elevation of temperature and show other signs of absorption from the uterus, more active measures should be resorted to.

In some instances the retention is due to the non-dilatation of the cervix, or to its recontraction, if it was dilated at the time of operation, but in others it seems to be due to the exaggerated angle between the cervix and body of the uterus, which is commonly seen in normal labor. To secure proper drainage in these cases the cervix should be freely dilated with a steel dilator. Even in patients who were not in labor when cesarean section is performed the cervix will be found so much softened and relaxed by the end of forty-eight hours that little force is necessary to dilate it, and the procedure usually causes so little pain that the use of an anesthetic is seldom called for, although any manipulation of the uterus produces more or less discomfort.

Strict surgical asepsis must be carried out. The patient is placed in the cross bed position, or on a table, if a good light cannot be obtained

in bed. The vagina is thoroughly cleansed. The cervix is exposed by a speculum, grasped with bullet forceps and drawn down as close to the vulval outlet as is possible without causing too much pain, and then carefully cleansed with alcohol. It is now freely dilated with a branched dilator up to the point at which it will admit one or two fingers freely. A small amount of lochia and perhaps a few clots will escape from the uterus, but usually a very small amount when it is compared with the degree of comfort the patient experiences from the relief of the retention. The important factor seems to be the establishment of free drainage, rather than the amount of retained lochia removed. Curettage under these conditions is distinctly not to be advised, the removal of the obstruction to drainage being all that is necessary.

Antiseptic Precautions.—The same antiseptic precautions should be adhered to after cesarean section as after normal delivery. If the vulva is not kept cleansed from lochia, decomposition will occur and the unpleasant odor will keep the patient uncomfortable. I do not believe that an ascending infection will result from this lack of cleanliness, but a nurse who does not keep her patient clean is not to be trusted in other respects. The vulva should be kept covered with a sterile pad, which should be changed as a routine every three or four hours, or whenever soaked with lochia. It should also be changed after urination or defecation. Whenever the pad is changed the vulva should be douched off with a non-irritating sterile solution. Boric acid or sterile water is satisfactory for the purpose. Corrosive sublimate should not be used, even in a weak solution, since it can accomplish no useful purpose as an antiseptic and not infrequently a dermatitis results from its use, which adds greatly to the patient's discomfort.

The use of vaginal douches during the early part of the puerperium should not be permitted under any circumstances. In the first place they accomplish nothing, and in the second they may be productive of harm, if improperly given. After the end of a week a sterile vaginal douche may be given daily, if the lochia have an offensive odor, and later in the puerperium douches may be used, if the uterus is not involuting properly, but in the routine care of the convalescence they have no place.

Lactation and Nursing.—It has seemed to me that patients who have been delivered by cesarean section are on the whole less likely to be able to nurse than women delivered normally, and that even if they eventually do make satisfactory wet nurses, the establishment of lactation is delayed for from one to three days longer than in the average normal patient. This may be accounted for in elderly primiparae on the theory of the atrophy of disuse, the breasts having gone so long without being

called on to function that degenerative changes have taken place in the glands.

In women with undeveloped pelves, i.e., justominor pelves, the pelvic organs are apt to be underdeveloped as well as the pelvis. It is very probable that the mammary glands are somewhat undeveloped also and are, therefore, in such women less likely to function properly, a fact which probably often accounts for the patient's inability to nurse her child. In other cases, as for instance in subnormal women who are delivered by cesarean section in preference to a pelvic delivery, the reason for unsatisfactory lactation is evident, since these women are seldom good wet nurses after a normal delivery. In many cases, however, no explanation for the unsatisfactory breast function is evident, although the delay may be due, at least in part, to the period of starvation which follows operation.

Since these classes of patients make up a very considerable proportion of the patients for whom I consider cesarean section advisable in private practice, the explanation of what is definitely true in my experience, that cesarean patients are less likely to prove satisfactory wet nurses than women delivered normally, may be merely the type of women on whom the operation is performed, rather than the method of delivery.

Temperature.—Patients who have undergone cesarean section seem to be more prone to have an elevation of temperature than patients who have had other abdominal operations. Aside from the patients in whom definite infection is diagnosed or suspected, or in whom retention of lochia occurs, various minor conditions cause an undue reaction, a fact which is to a certain degree noticeable in women after normal labor. This is probably to be explained by the fact that absorption from the extensive wound surface, plus the waste products produced by the involution of the uterus, tax the excretory organs to the limit and render the patient unduly susceptible to minor stimuli. Furthermore, in the closing of the uterine wound a large amount of suture material is buried, and it is also probable that a certain amount of pressure necrosis develops around the sutures, particularly if they are tied too tightly in the attempt to control all hemorrhage, both of which factors increase the absorption and render the patient more susceptible to minor disturbances of function which under normal conditions would not give a noticeable reaction.

Immediately following operation there is apt to be a moderate rise of temperature, as a rule not over 100.5 degrees, but occasionally reaching 101 or 102 degrees. In clean cases the temperature reaches normal

in from twenty-four to forty-eight hours and should remain at approximately the normal level throughout the remainder of the convalescence, but any complication which arises will be attended by a rise in temperature. This initial temperature may be due to a slight peritoneal reaction caused by the spilling of more or less liquor amnii into the abdominal cavity when the uterus is opened. It is unimportant in itself, but shows what may be expected, if in infected cases any of the infected liquor escapes into the peritoneal cavity.

Any cause which would lead to a rise in temperature after a normal delivery will cause a similar reaction after cesarean section, but in most cases the uterus will be the offending organ.

Pulse.—The pulse after cesarean section shows nothing remarkable. It is apt to be very rapid during operation, and at the time when the uterus is opened the pulse may temporarily disappear. This should cause no anxiety, however, as it seems to be entirely without significance. During closure of the uterus the pulse usually improves in quality and becomes slower, to again become more rapid when the patient begins to come out of ether. The pulse rate then drops to or even below normal in patients who have not suffered severely from hemorrhage or exhaustion, just as in the normal obstetric case. A rising pulse within a few hours after delivery may be a suggestion of internal concealed hemorrhage and should call for investigation.

A sharp rise in the pulse rate may occur in the second twenty-four hours, the rate sometimes reaching 130-140. This is often an accompaniment of acute dilatation of the stomach, and indeed a rapidly rising pulse may be the first noticeable symptom of this complication and should be taken as a danger signal. With marked intestinal distention the pulse will usually be rapid, but in these cases the change will be gradual and not as sudden as in dilatation of the stomach. In other complications the pulse rate follows the temperature fluctuations more or less closely, except that in cases of general peritonitis a rising pulse will often be associated with a dropping temperature in the terminal stages.

As a general rule a dropping pulse is a favorable sign in cases of infection, even though the temperature remains high, and a favorable prognosis can be given in such cases, since the temperature will follow the pulse within a day or two, the improvement in the pulse rate being an index of the increased resistance of the patient.

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CHAPTER X

COMPLICATIONS OF THE CONVALESCENCE

Acute Dilatation of Stomach—Pneumonia—Embolism—Septic Complications—Infection of Uterine Wound—Cystitis—Thrombophlebitis—Peritonitis—Appendicitis—Bibliography.

The convalescence from cesarean section may be expected to be a fairly smooth one in the majority of patients in whom the operation is elective, but any of the complications which occur after normal delivery or after laparotomy may arise, and certain ones, e.g., retention of lochia and acute dilatation of the stomach, are relatively common. The convalescence following operation on doubtful risks is apt to be a very stormy one, however, and many patients only recover after a prolonged and desperate illness, while the mortality in these patients is relatively high.

Acute Dilatation of the Stomach.—Perhaps the most common, as well as the earliest complication to be looked for, following cesarean section, is acute dilatation of the stomach. It occurs much more frequently apparently after this operation than after any other laparotomy, and is more liable to affect certain types of patients than others, being met with much more often in private than in hospital practice.

Patients suffering from ptosis of the abdominal viscera before the beginning of pregnancy seem to be more apt to develop this complication than other types of patients. This is probably due to the fact that the stomach, which has been held up in good position by the enlarged uterus, prolapses as soon as the support is removed. In its new position a kink is formed at or near the pylorus and drainage is interfered with to such an extent that it becomes acutely distended. That acute dilatation is not more common after normal delivery suggests that some other factor than ptosis must be present, and this factor is probably supplied by the increased gas formation and diminished peristalsis, which so often follow abdominal operations, a more or less sharp angle at the pyloric end of the stomach being closed by the pressure of the distended intestine below. The condition seems also to be favored by the ingestion of large amounts of fluid in the first thirty-six hours after operation, and apparently occurs less often if the patients are given water rather sparingly and are on a semisolid diet from the beginning.

Another class of patients who seem particularly liable to this complication are the neurotic women who suffer markedly from hyperacidity and other digestive disorders during pregnancy. There may be a tendency to ptosis in these women also, but in many cases at least it is not demonstrable until after delivery, and has not been discovered in the non-pregnant condition.

The relative frequency of gastric dilatation in private, as compared with hospital practice, would seem to be due to the fact that in private practice the operation is often performed because the patient seems a poor general risk for the strain of labor, rather than for pelvic insufficiency, a fact which only enters into hospital practice to a limited degree. There seems to be no doubt but that the high incision predisposes to this complication to some extent, but the general condition of the patient seems to be even more of a factor in its production.

In typical cases the patient seems in good condition shortly after operation. The temperature may be slightly elevated, 99°-100° or practically normal at the end of twenty-four hours, and the pulse is normal. There is no nausea and the patient seems to be doing well. Some time during the next twelve to twenty-four hours the patient's condition changes markedly for the worse. Nausea develops, attended by hiccough in many cases, and the patient may begin to spit up small quantities of a dark greenish fluid with an unpleasant odor, or she may vomit a large amount of the same material with a good deal of gas. After a few hours she begins to look badly and the face becomes grayish and drawn. The temperature rises in some cases to 101° or 102°, and the pulse becomes progressively more rapid, at times reaching 140 or more within a few hours, and the quality changes for the worse. The picture often looks like that seen in a beginning peritonitis. The abdomen is distended, particularly in the upper portion, but the distention is soft and the abdomen is usually not unduly tender. At times the patient appears seriously sick, and she is always restless and uncomfortable. This sudden change from being in satisfactory condition to being apparently a very sick woman suggests one of two things, either peritoneal infection, due to a very virulent organism, in which case the prognosis is hopeless, or acute dilatation of the stomach. In most cases it is the latter and the means of diagnosis and treatment are the same, i.e., gastric lavage. The passage of the stomach tube is often followed by the explosive escape of gas through the tube, followed by a large amount, often a pint or more, of the same sort of material that the patient has been regurgitating. The stomach should be washed out with warm water containing bicarbonate of soda and then drained and left empty. The

patient should then be given an injection of 1/6 gr. of morphia to quiet her and give her a chance to sleep. She should be made to lie on the right side as much of the time as possible to favor drainage of the stomach.

Everything should be withheld by mouth for several hours. If the patient is uncomfortable from thirst, or if the tissues seem dried out, the mouth should be swabbed out with water, and fluid should be given under the skin or by rectum. After five or six hours food may be given, preferably of the semisolid variety, in small amounts. The improvement in the patient's condition under this form of treatment is very rapid, the pulse and temperature dropping quickly to normal, unless the condition has persisted some time before being treated. Occasionally the condition may recur and a second lavage be necessary, but this is the exception, and one treatment is usually sufficient, the only after effect being an apparent delay in the establishment of lactation, which seems particularly late in these cases, and is probably due to the rather prolonged period of starvation to which the patient is subjected. Whether an uncomplicated acute gastric dilatation would ever prove fatal is a question. The majority of fatal cases who have come to autopsy have shown either a beginning peritonitis or intestinal obstruction, but the symptoms are often sufficiently alarming to suggest the possibility of a fatal issue unless relief is given, and the results of lavage are prompt and satisfactory.

Pneumonia.—So-called ether pneumonia occasionally occurs after cesarean section, but with no greater frequency than after other surgical operations, except perhaps in cases who have been operated on as emergency cases after having been in labor for some time and who have had no proper preparation. It is not uncommon, in my experience, to find that labor not infrequently interferes with digestion and that the stomach after labor often contains undigested food, though no solid food has been taken for ten or twelve hours, or even longer. Inhalation pneumonia is not an uncommon sequel to vomiting under the anesthetic in patients of this type.

The treatment is symptomatic and the course is usually short and favorable. A certain number of the patients die, however, and pneumonia must be considered as one of the dangers attendant on surgery under general anesthesia, especially on patients who have not been properly prepared for operation. Within the last few years it has been suggested that the so-called ether pneumonia is not dependent on the anesthetic, but occurs with practically equal frequency after abdominal operations, performed under local or spinal anesthesia, and at least one

series of cases has been reported to support this claim. In these cases the pneumonia must be embolic in character and not due to irritation from the anesthetic. This has, however, not been my own experience.

Embolism.—In comparatively rare instances, very rare if we except the cases secondary to pelvic thrombophlebitis, pulmonary embolism occurs with serious or fatal results. There are no means of predicting when it will occur and no means of preventing its occurrence. It is simply one of the surgical accidents which may follow any case of labor or abdominal operation, but particularly operations on the uterus, and its possibility must be considered in stating the prognosis of the operation to the patient. It is probably slightly more common after cesarean section than after normal labor, but this is probably due to the fact that phlebitis is rather more common in these cases, owing to the fact that many operations are performed on patients who are already infected with organisms of low virulence by vaginal interference at the time operation is undertaken. Embolism may occur at any time after operation, just as after normal labor, growing progressively less frequent the longer the interval since operation in normal cases. In septic cases with thrombophlebitis embolism usually occurs late in the convalescence, i.e., between the second and fourth weeks as a rule, and the patient cannot be considered out of danger until sufficient time has elapsed for complete organization of the thrombus to take place.

Septic Complications.—One of the most common septic complications following cesarean section is a thrombophlebitis of the pelvic veins, which may involve the veins of one or both legs by extension and give rise to phlegmasia alba dolens. The general consensus of opinion is that phlebitis is secondary to a septic process at the site of operation.

As is to be expected, therefore, phlebitis is most common in the patients on whom cesarean section is performed under relatively unfavorable conditions, i.e., after prolonged labor or after repeated vaginal examinations or attempts at delivery. The uterine wound in these cases is prone to become infected and a septic thrombosis of the pelvic veins results. In other cases, when the uterine sutures have been tied too tightly, a certain amount of pressure necrosis results. If no infective agent is present the necrotic tisue will be taken care of without symptoms, but in a large proportion of cases a culture from the fundus of the uterus will show pyogenic organisms by the end of the week or ten days after delivery, even though no vaginal interference has been practiced, as has been repeatedly demonstrated in cases delivered normally. If the sutures used in closing the uterine incision enter the uterine cavity these

necrotic areas may become sufficiently infected to form a septic focus from which phlebitis may result.

In still other cases a septic cystitis, due to unclean catheterization, may be the focus of infection which results in phlebitis. In other words any septic focus in or near the uterus may act as the exciting cause. I am extremely skeptical in regard to the occurrence of phlebitis in the absence of sepsis, except in the very rare cases which occur so soon after delivery that only a preëxisting sepsis might have caused them, and even in these cases a septic focus elsewhere in the body cannot be eliminated as a possible cause.

As a rule, in the patients who develop phlebitis, the convalescence has not been normal. The pulse and temperature have usually been suggestive of the fact that some septic absorption was going on, although the symptoms may not have been severe enough for definite localization. Usually the definite symptoms appear at or near the end of the second week, pain and tenderness in the groin with swelling of the leg and a rise of pulse and temperature.

The treatment of these cases consist of absolute rest and the relief of pain. The affected leg should be placed at once in a pillow splint, partly for comfort, but more to prevent the patient from moving it thoughtlessly, and thus favoring the detachment of a portion of the occluding thrombus and embolism. An ice bag applied over the groan, lead and opium liniment along the course of the affected veins, and the use of aspirin will usually control the pain, though in some cases opiates may be necessary for a few days. Fresh air, sunlight and good food, to raise the patient's general condition, should form a part of the treatment.

It is always a question whether anything can be done to limit the extension of or to favor the resolution of the thrombi in the affected veins. For several years I have employed lemon juice, or citric acid in capsules, in the treatment of all cases of phlebitis, or as a prophylactic measure in cases whose convalescence was not perfectly normal, on the theory that although the pelvic phlebitis might occur when a septic process was present in the uterus, the extension of the process into the veins of the legs might be prevented or limited by lowering the clotting power of the blood by neutralization of its calcium content.

The approximate dosage is forty-five grains of citric acid per day for an average sized person, or a corresponding amount of lemon juice. Although it is impossible to state definitely whether any good is accomplished by this method of treatment or not, I am convinced in my own mind that such cases of phlebitis as I see are milder in course and

leave less permanent disability than before I began the use of citric acid. It may be, of course, that the cases have all been mild, and that the veins of the legs would not have been seriously involved in the process in any case, but the general results of my experience would seem to show that citric acid has a distinctly favorable action in these cases.

The great danger to the life of the patient in septic thrombophlebitis is pulmonary embolism, and embolism is distinctly favored by premature motion of the affected limb before organization of the clot is complete. It is, therefore, necessary to keep the patient at rest until complete organization of the thrombi must have taken place under all ordinary conditions, and then for a week longer to be absolutely on the safe side. It is generally fair to assume that after the temperature has been normal for at least a week and the swelling of the leg has practically subsided, and also the pain has entirely disappeared, that the danger of embolism is over, and the addition of a week's rest makes assurance doubly sure. In these cases, although the patient is usually very impatient to be up and about after her long confinement to bed, I find that a frank statement of the facts never fails to have the desired result and the patient is willing to remain at rest as long as seems best, even though it may not be necessary.

Abscess of the Uterine Wall.—Infection of the uterine wall with abscess formation is a not infrequent complication of cesarean section performed on patients who have been exposed to infection prior to the operation. It is particularly liable to occur when the uterine incision is so sutured that the endometrium as well as the musculature is included in the sutures.

The symptoms are slow in developing as a rule, unless the infective agent is a virulent streptococcus. The symptoms in the main are persistent elevation of the pulse and temperature, increased leukocytosis, moderate abdominal distention suggestive of pelvic peritonitis, and marked tenderness of the uterus. The outcome largely depends on the organism which causes the infection and the efficiency of the peritoneal suture. If the organism which causes the infection is a virulent streptococcus, extension to the peritoneum, or infection of the blood current is probable. If the organism is a staphylococcus or the colon bacillus, local pus formation is the rule, and the outcome, unless the abscess is drained, depends on the efficiency of the uterine suture. If the peritoneal suture has been carefully done and is well healed, the abscess will probably eventually point into the uterine cavity after the catgut sutures are absorbed, and the patient will recover after discharging a considerable amount of pus through the cervix. If the abscess formation is close

to the peritoneum, or if the peritoneum has not been carefully sutured, the abscess will point into the peritoneal cavity. Unless the condition is appreciated in such cases and the abscess drained, rupture into the peritoneal cavity will take place, and the patient die of peritonitis, unless operative relief is promptly given, and probably even then. This is presumably what takes place in the patients who are running a septic temperature and pulse with moderate distention, but with no abdominal tenderness except over the uterus. The patient seems only moderately sick, there is no vomiting, the bowels can be moved readily and no definite evidence of peritoneal involvement can be made out, until the patient is seized with sudden sharp abdominal pain and goes into collapse, the pulse becoming weak and thready and even disappearing. Prompt operation and drainage in these cases may save the patient even then, but by the time the surgeon sees the patient her condition is usually such that interference is manifestly hopeless, and she dies within a few hours.

Early recognition of the condition and operation with drainage is the indicated treatment, if the primary operation has been done through a high incision. If, however, the operation has been done through a low incision, as I believe is wise in all cases in which there is suspicion but not proof of antepartum infection, the uterus will become adherent to the abdominal wound in most cases and drain through it without infecting the general peritoneum.

In other cases the abscess is deep in the uterine wall and does not burrow in either direction. These patients run a septic chart and gradually lose ground as time goes on, dying eventually from the exhaustion of long continued sepsis or from a general septicemia, unless the uterus is opened and drained. In these cases the uterus should be either removed, or what is preferable, sutured to the incision, incised, and left open to be closed at a subsequent operation. In all of these patients a weak scar will remain in the uterus, which is very liable to rupture, if in subsequent pregnancies the patient is allowed to go into labor, and may even rupture during pregnancy, a fact which must be borne in mind in all patients who have had repeated sections for delivery. A febrile convalescence after cesarean section should be regarded as being possibly due to infection of the uterine incision, or as indicating a poor healing of the uterus with danger of rupture in case of future pregnancies. In these cases, at least, the policy of "once a cesarean section always a cesarean section" is the proper course to pursue, and the operation should be performed preferably before labor begins, and in any case before hard contractions have appeared, in order to reduce

the danger of uterine rupture to a minimum. There will always be in such patients a slight danger that the scar will rupture during pregnancy and the patients should be carefully watched throughout with this possibility in mind.

Septic Peritonitis.—Infection of the peritoneal cavity is a constant menace in all abdominal operations. With the improved aseptic technic of modern surgery this danger is reduced to a minimum, but even with the utmost precautions a slip in technic may occur and pass unnoticed with fatal results to the patient, and if the operative technic is any but the best the danger of infection is greatly increased. In clean abdominal surgery this risk is a slight one, but cases of infection occasionally occur in the practice of the most careful operators, and, therefore, the risk must be considered as always present when the prognosis of operation is under discussion, and the utmost care taken to guard against it.

In cesarean section it is possible for peritoneal infection to occur from four different sources, which must be recognized and guarded against as far as possible: (1) Direct infection of the peritoneal cavity by faulty technic at the time of operation is always possible, but should be exceedingly rare if the operation is performed by a competent operator with a well trained team of assistants in a properly equipped hospital. (2) Infection of the uterus may be present at the time of operation as a result of manipulations by the attendant, or from extension upward from the vagina in cases long in labor, especially when the membranes have been ruptured for many hours, and peritoneal infection may result from the escape of infected material into the peritoneal cavity when the uterus is opened. (3) In a third group of patients the peritoneal infection develops so late in the convalescence that it seems fair to assume that the operation and the uterus at the time of operation were both aseptic, but that the vaginal secretions contained the offending organisms and that an ascending infection followed operation, the uterine wound being first involved and later the peritoneum either by direct extension or by rupture of an abscess of the uterine wall into the peritoneal cavity. It is impossible to tell in advance which patients harbor organisms in the vagina likely to prove dangerous later, particularly in the light of Williams' experiments, effective seemingly to prove that the normal vagina during pregnancy does not contain pyogenic organisms. (4) Focal infection in other parts of the body may be the underlying cause of certain cases of peritonitis which develop when no other apparent cause can be found. It has been definitely proven in these focal infections that various joints may become directly infected as a result of an undrained septic process around decayed teeth or infected tonsils. It is, therefore, perfectly

possible that organisms may reach the peritoneal cavity by the blood current, and the peritoneal resistance being lowered as a result of the handling at operation, find a favorable soil for development.

In the first two varieties of infection the symptoms develop shortly after operation. The pulse and temperature begin to rise by the end of twenty-four hours. Abdominal distention develops early and increases steadily in spite of attempts at catharsis, and vomiting is apt to be an early and persistent symptom in spite of gastric lavage. Abdominal tenderness is present from an early period, but muscular spasm and rigidity develop late, if at all. The patient goes down hill rapidly and dies in a few days, unless the wound is reopened and the peritoneal cavity drained in the early stages of the infection, and even then the prognosis is grave at the best, while if the infective agent is a virulent one, it is practically hopeless from the first. In a few cases incision of the posterior vaginal vault with through and through drainage, the patient being placed in Fowler's position, may limit the spread of the infection and result in recovery.

In cases of infection due to slightly virulent organisms the symptoms are slower in their onset, although the convalescence is abnormal after the first day or two. For the first twenty-four hours or so the pulse and temperature are not unduly elevated and the condition may be mistaken for the ordinary reaction to contamination of the peritoneum with blood or uninfected liquor. By the end of forty-eight hours after operation it is fairly evident that infection is taking place from the uterus, and there may be beginning signs of peritoneal involvement, as shown by beginning distention. The bowels are usually to be moved without great difficulty, and gas is passed freely, though the distention recurs promptly after a short period of relief. Vomiting is not a prominent symptom, at least in the early stages. If the abdomen were drained at this stage the majority of patients would be saved, but since in the majority of cases in this condition the infection remains localized to the uterus and pelvic peritoneum, the surgeon naturally hesitates to reopen the wound for a condition the nature of which is doubtful, and, therefore, procrastinates until the extension of the process makes it evident that the patient is suffering from a diffuse and spreading peritonitis, when reoperation is usually too late and merely hastens the end.

In another group of patients of this class the symptoms are merely those of uterine infection, except for a moderate degree of intestinal distention, which may be no more marked than after a perfectly clean laparotomy. The pulse and temperature are elevated, there is no vomiting and the bowels are moving freely. There is no abdominal

spasm and tenderness is limited to the region of the uterus, and is little, if any, more marked than is noted in uninfected cases, though careful observation will show that it is increasing from day to day instead of growing less, as it should do, indicating abscess of the uterus.

In such cases, when cesarean section has been performed through a low incision, the uterus will often become adherent to the wound and eventually the abscess may drain through the wound in some instances, or it may drain through the uterine cavity. If the high incision has been employed, drainage must take place either through the uterus or into the peritoneal cavity, unless the abscess is drained by a second operation. If rupture takes place into the peritoneal cavity, the symptoms become acute. The patient who has previously been showing signs of an infection but who has not seemed unduly sick, is seized with sudden abdominal pain which may be extremely severe, and promptly goes into collapse, often becoming pulseless. The face is drawn and pinched and the general condition is so extremely bad that it is evident that to add to the shock by even a slight operation will inevitably prove promptly fatal. Relief for the pain should be given by morphia and active stimulation should be employed in the hope that the patient may react sufficiently to allow incision and drainage. If the reaction occurs, drainage may be employed, preferably under local anesthesia, but the outlook is not good. If the patient does not react, there is little use in attempting drainage, since any interference is usually promptly fatal.

In cases of infection secondary to the extension upwards from the vagina the symptoms are late in developing. The pulse and temperature are elevated, but usually only slightly so at first. The lochia may be suppressed and the condition mistaken for simple interference with drainage, due to lack of cervical dilatation. Dilating the cervix gives no relief, however, and the symptoms increase steadily, and unless the wound is opened and the peritoneal cavity drained the patient often dies, and sometimes even then.

Wound Infection.—Wound infection and stitch abscess are occasional complications of any abdominal operation, and cesarean section is not immune, in fact there seems to be a somewhat increased liability. This is probably due to the fact that there is in many patients an increased fat deposit in the abdominal wall during pregnancy, and fat is prone to become infected and break down. In addition many of these patients are operated on late in labor and the abdominal wound is exposed to infection, from the fact that, though it may be possible to protect the peritoneal cavity in infected cases, it is not possible to perfectly protect the abdominal wall and more or less infection is apt to occur.

If the infection is superficial, it is of no particular importance, except that it delays the convalescence and is to be treated as in other cases of wound infection, i.e., provision is made for drainage and the wound is allowed to close by granulation aided by tight strapping after the infection has cleared up. Secondary suture to accelerate healing may be of value in some cases.

If the infection involves the whole thickness of the abdominal wall, hernia in the scar is apt to be a sequence, since the wound must be opened freely and packed. Even in these cases, however, hernia may sometimes be prevented by tight strapping or by secondary suture after the infection has cleared up.

Acute Appendicitis.—Acute inflammation of the appendix may complicate the convalescence from cesarean section, just as it may occur at other times and should always be considered as a possibility in any patient who develops acute abdominal symptoms during an otherwise normal convalescence.

I have seen two cases in my experience. In one an abscess about a gangrenous appendix was found and drained, the patient recovering. The other patient was seen in consultation already moribund. The history in brief was that after three days of a normal convalescence the patient developed signs of an acute appendix but was not operated on, and after two days the appendix ruptured and general peritonitis developed, causing the death of the patient.

It must, therefore, be remembered that a patient is not, because she has had a recent cesarean section, immune to any other disease, but that acute symptoms suggestive of trouble outside the uterus should receive the same attention that they would call for under normal conditions, and that symptoms suggestive of an acute attack of appendicitis call for operative relief just as at other times. There is a natural hesitation to reopen the abdomen before the diagnosis is absolutely certain, especially when not all of the cardinal symptoms are present. Under ordinary circumstances spasm and rigidity of the abdominal wall over the inflamed appendix would have considerable weight in deciding the proper treatment. After a recent delivery, whether or not by the abdominal route, the relaxed condition of the abdominal walls renders spasm and rigidity of little value as guides to an underlying inflammatory condition, and if marked distention is present and the abdomen is tense, little or nothing can be learned by examination. In these cases the history of sharply localized pain and tenderness, unless the abdomen is markedly distended, taken in connection with the pulse, temperature

and leukocytosis, may call for an operation when the physical findings would hardly justify it.

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CHAPTER XI

STERILIZATION OF THE PATIENT AT THE TIME OF OPERATION

Sterilization Sometimes Justifiable—To Avoid Repeated Operations—Not Advisable at First Operation Unless Organic Disease Contra-indicates Future Pregnancies—In Cardiac Disease—In Chronic Nephritis—Methods of Sterilization.

No discussion of cesarean section can be complete without consideration of the advisability of sterilizing patients before the abdomen is closed when cesarean section has been performed, and the operator feels that if the patent becomes pregnant at some future time, cesarean section must be the means of delivery. A considerable literature has accumulated on the subject, some writers taking the ground that sterilization is never permissible under any circumstances, while others advocate it as a routine procedure at the time of the second, if not of the first, operation and still others believe that the question should be left to the patient and her husband for decision.

That sterilization is not a necessary procedure on account of the necessity of repeated sections is shown by the fact that series of operations are reported in which cases have been delivered three, four, and five times by section, and I have seen one patient who has had six sections successfully. Furthermore, the risk of each successive operation is no greater than the risk of the primary operation, and in cases in which no organic disease contra-indicates future pregnancies the rights of the patient should be considered and the question should be left to her and her husband for decision, if they are of normal intelligence, since the patient has a right to decide whether she will undergo repeated pregnancies, each of which must end in cesarean section, or at best live in constant fear of the same, or be protected against the risks of pregnancy and repeated laparotomy. Abortion is not, in my opinion, to be considered as an alternative in these cases, unless the risks of repeated cesarean section are thought to be too great, and even then repeated abortion should never be considered, and the patient should be sterilized to avoid its necessity.

In general it may be said that a patient should not as a rule be sterilized at the time of the first cesarean section, unless some organic lesion

exists which renders the recurrence of pregnancy dangerous or undesirable. In healthy women the dangers of a second operation are so slight that I do not feel the attendant is justified in suggesting sterilization at the time of the first section, and even if the patient requests it, he should urge on her very strongly the disadvantages of a one child marriage and the fact that, if she is sterilized and the child should die later, it may prove a matter of lifelong regret to her that she can have no other children. He should be willing, however, if she asks for information, to give her definite instructions as to the best means of avoiding pregnancy, always informing her that no method of prevention is sure except abstinence from exposure.

If, however, any condition is present which renders future pregnancies dangerous to the life or health of the mother, e.g., heart lesions, chronic nephritis, etc., or if the cesarean section has been rendered necessary by the results of operation to repair the damage suffered at previous labors, and the patient has other living children, the attending surgeon is justified in urging the propriety of sterilization, or at least in suggesting the possibility of its performance, so that the patient and her husband, being in full possession of the facts, may consider the question carefully. In other words, if any condition is present which may possibly render future pregnancies dangerous to the life of the mother, or leave her in such a condition that she may be more or less seriously invalided, the advisability of completing the operation by some procedure which, without adding to the immediate risks appreciably, will remove this source of danger for the future, is properly to be suggested.

In patients with cardiac disease who have had attacks of decompensation, either in the non-pregnant state or during pregnancy, sterilization at the time of operation should be most strongly urged as a life or health saving procedure. In these patients the strain of repeated pregnancies on the damaged heart is sure to be detrimental, and may prove fatal, and unless operation is refused, I do not feel that the surgeon has done his duty by his patient unless he leaves her in such a condition that the danger of repeated pregnancies is removed for good.

If a patient who has had one cesarean section comes to operation a second time, the attendant may be justified in suggesting the propriety of sterilization, even though she may be in perfect health. The operation should not be urged in these cases, but the facts should be placed squarely before the patient, and it should be left to her to decide whether, having two healthy children, she wishes to be left in a condition in which pregnancy may occur again, with or without her volition, and find it necessary to undergo the dangers and discomforts of future pregnancies with

the surety of an abdominal delivery at the end, or whether she prefers to know that pregnancy will be impossible in the future. In my experience the majority of women fear cesarean section so little that they prefer to undergo repeated operations in the absence of conditions which render pregnancy unduly dangerous, rather than to feel that they will be deprived of the right of choice as to whether they will have other children, if at a later date it may seem desirable; and furthermore to many women the fact that they have been rendered sterile is more repugnant than the possibility of future sections, in spite of the risks which may arise, if pregnancy ensues.

There remains another class of patients, however, for whom the advisability of abdominal abortion and sterilization cannot be too strongly recommended. This group includes the patients who have serious organic disease, to whom pregnancy is a serious menace, and who face the alternative of death or serious illness if pregnancy occurs and is not interrupted. First in this class stand patients who have serious organic heart lesions, particularly mitral stenosis. Given a patient with a serious cardiac lesion who has had even a single severe attack of decompensation during previous pregnancies, or when not pregnant, and who, becoming pregnant again, suffers from decompensation early in this pregnancy, abortion and sterilization offer the only chance certainly for future health and possibly for life. If compensation can be restored by rest and the use of digitalis, the operation can be performed at one sitting, the ovum being removed from the uterus by hysterotomy and the patient sterilized at the same time. If compensation cannot be restored while the pregnancy persists and the patient is in such condition that laparotomy seems inadvisable at the moment, the uterus should be emptied by the most conservative method and the sterilization deferred until the improvement in the patient's condition warrants it.

The same holds true in patients with advanced chronic nephritis who have had repeated miscarriages or still births. In these cases it must be remembered that each attempt at pregnancy increases the renal damage and shortens the patient's life. Since past experience has proved that the chances of a living child are practically nothing, the mother's interests are the only ones to be considered, and the pregnancy may very properly be ended for the sake of reducing the damage which the continuance of pregnancy will inflict on her kidneys. Since a simple abortion leaves her in a condition to become pregnant again, it is an incomplete operation, and delivery by the abdominal route followed by sterilization is the indicated procedure.

Similar treatment may be called for in patients who have suffered

from dementia at some previous time in their lives and who develop symptoms of a new attack during pregnancy. Such women should not be subjected to repeated pregnancies, even though the present one is not interfered with, and cesarean section followed by sterilization may properly be considered as the best method of delivery.

Methods of Sterilization.—Various methods of sterilization are possible and in general it may be said that each has advantages and disadvantages of its own under certain conditions.

Removal of the ovaries is the most obvious method, but is distinctly the least desirable of the methods to be considered, except in women with osteomalacia, in whom it may prove the cure of the disease. It is only justifiable otherwise in women at or near the menopause, in whom the ovaries are extensively diseased or when for some reason it is thought necessary to remove all the pelvic organs, as in early carcinoma, when the ovaries are removed, not for sterilization, but as part of an extensive operation in the attempt to eradicate the disease.

Inversion of the fimbriated extremities of the tubes and closure of the outer ends by suture has been recommended and in most cases is undoubtedly efficient. In some cases, however, it is conceivable that the closure may not be perfect or that the adhesions formed may be absorbed, cases having been reported in which pregnancy has followed such an operation, and since more certain means are available, this method is not to be advised. Burying the fimbriated extremities of the tubes in the broad ligaments has been suggested recently. In this operation a short incision is made in the peritoneal coat of the anterior surface of each broad ligament and the fimbriated end of the tube inserted, the peritoneum being sutured over all. It is a simple procedure and probably effective. This method has been particularly suggested for conferring temporary sterility on patients with a temporary contra-indication to pregnancy and it has been suggested that, if pregnancy seems desirable at some future time, the operation may be undone with a fair hope of success.

Double ligation of the tubes with division between the ligatures has been a common procedure, but in some cases the canal of one or both tubes has been reëstablished after absorption of the ligatures and pregnancy has followed, showing that this method, though usually successful, is not to be depended on.

Supravaginal amputation of the body of the uterus is an absolutely certain method of preventing future pregnancies and is to be advised in certain classes of cases, especially when the body of the uterus is the seat of fibroid tumors, or when any suspicion of infection before opera-

tion is entertained. It has the disadvantage of adding somewhat to the risk of the operation, and, therefore, is preferably not performed unless some further indication is present than merely the desire to prevent future pregnancies.

The most satisfactory method of sterilization, in the great majority of cases, is the excision of the proximal ends of the tubes from the cornua of the uterus by V shaped incisions. The wounds in the uterus are then sutured and covered with peritoneum and the ends of the tubes are buried in the folds of the broad ligament and covered with peritoneum. This is a simple procedure, which adds only a few minutes to the length of the operation and nothing to its risks; it does not interfere with future menstruation and is absolutely certain in its results. It has the further advantage that, if the patient desires at some future time to have children, a second operation to implant the tubes in the uterine cornua may be performed, and offers a slight chance of success, although nothing can be promised from it.

Of course, it may be urged that such operations are unnecessary and improper, and that the true remedy against pregnancy lies in continence on the part of the patient and her husband. This is a perfectly proper criticism in the cases in which sterilization is performed, because the patient fears future cesarean sections and wishes to avoid them. However, in patients to whom pregnancy is a serious menace and whose lives may be sacrificed if conception occurs, unless an abortion is promptly done, sterilization is, in my opinion, not only justifiable but almost obligatory, since accidents happen in spite of all precautions, and in these patients nothing should be left to chance and the patient must be protected against herself. It is very easy to adopt a high moral tone and argue that abstinence from intercourse is the simple and easy method of solving the problem, but experience has proved otherwise, and I have seen too many lives sacrificed because the physician contented himself with advise as to what must not occur, without taking steps to see that his advice was taken, not to feel that, if I am willing to say to a patient and her husband that pregnancy must under no circumstances occur again, I have failed in my duty to such a patient unless I am also willing to permanently remove the danger. This is particularly the case when the abdomen is already opened and the added procedure entails no added risk to the patient.

CHAPTER XII

SPECIAL METHODS OF OPERATION

Porro Operation—Supravaginal Hysterectomy—Indications—Technic of the Porro Operation—Technic of Supravaginal Hysterectomy—Panhysterectomy—Bibliography.

It has been generally recognized, ever since Porro published his monograph in 1876, that under certain conditions removal of the uterus in part or as a whole after the performance of cesarean section adds greatly to the safety of the patient. When Porro first described his operation the maternal mortality of cesarean section was so appalling, that abdominal delivery was considered only when all other methods had been tried and had failed, leaving cesarean section as the only chance for the patient, the only alternative being to allow her to die undelivered. The introduction of the Porro operation led to such an improvement in the results of abdominal delivery that for a time it enjoyed marked popularity, and although the technic has been modified to keep pace with the improvements in surgery, the operation for amputation of the uterus at about the level of the internal os is still commonly spoken of as the Porro cesarean section.

Experience with the conservative cesarean section has proved that the high mortality of early days was due to two factors; first, that the operation was seldom or never performed on favorable cases, but was an operation of last resort, only to be considered for patients in whom attempts at delivery by other means had proved futile; and second, because the uterus was not sutured, but was dropped back into the abdomen at the end of operation, to act as a source of hemorrhage and infection. Furthermore, asepsis was unknown. Taking these facts into consideration, the wonder is not that the mortality was so great, but that any patients survived.

The Porro operation was devised to eliminate the danger of returning the probably infected, bleeding uterus to the abdomen, and fulfilled its purpose excellently.

When Sänger published his great work in 1882, which forms the basis of the modern cesarean section, it was enthusiastically received and the Porro operation was largely given up. Further experience

proved, however, that in patients who were already infected at the time of operation the results of the conservative operation were unsatisfactory, and the modified Porro operation was revived for use in those cases. At the present time the operation of supravaginal hysterectomy has superseded the earlier Porro operation, but the indications for its performance are the same.

Indications for Removal of the Uterus.—The performance of an abdominal delivery on patients already known or supposed to be infected is contra-indicated whenever any other means of delivery, even of a mutilated child, is possible, unless the child is in good condition and the parents elect that its life, for religious or other reasons, compensates for a very serious risk to the mother, after having had the facts carefully explained to them. If the life of the child is chosen at the possible expense of the mother, or if the pelvic contraction is so marked that delivery from below is impossible, or carries with it dangers believed to be practically as great as those attendant on cesarean section under the circumstances, the operation may be properly undertaken, a very grave prognosis being given. In these cases, however, it should either be performed extraperitoneally or, preferably, the uterus, instead of being sutured and returned to the abdominal cavity, should be amputated and removed, since it adds greatly to the danger, if the infected uterus is replaced in the abdominal cavity, to act as a source of peritoneal infection.

In other cases, as for instance when the pregnant uterus is the seat of multiple myomata which require operation in any case, the conservative treatment is cesarean section followed by supravaginal amputation, to save the patient from the dangers of a second abdominal operation at a later date for the removal of the tumors.

In cases of premature separation of the placenta, for which cesarean section has been performed, it will occasionally be found that, on account of the disintegration of the uterine musculature by the hemorrhage which has taken place into it, the contractile power of the uterus has been destroyed and the uterus cannot be stimulated to contraction. To return such a uterus to the abdominal cavity, even after suture, is merely to invite disaster from postpartum hemorrhage, and the only safe treatment is removal of the uterus.

Atony of the uterus with increased hemorrhage is also seen in certain other conditions, notably overdistention of the uterine musculature, whether as a whole or in part. The action of the uterus should be carefully watched, therefore, after the delivery of multiple pregnancies or in cases of hydramnios, and particularly in cases of sacculation of the

uterus, in which the section was necessitated by dystocia following fixation of the uterus to the abdominal wall in faulty suspension operations. In the latter class of cases the development of the anterior uterine wall during pregnancy is seriously interfered with, if not practically prevented, by the firm adhesions between it and the abdominal wall, and the posterior wall, which has been markedly overdistended, is very thin and has in some cases practically lost its power of contraction. This condition predisposes markedly to postpartum hemorrhage and the uterus should be stimulated to contraction by all possible expedients. If, however, it does not contract satisfactorily within a reasonable time, and especially if any appreciable amount of hemorrhage occurs, a supravaginal amputation should be promptly performed, since it is an absolutely unsurgical procedure to replace a relaxed and bleeding uterus when it has proved impossible to provoke adequate contraction, whether mechanically or by the use of drugs.

Porro Cesarean Section.—The operation as described by Porro—for removal of the uterus—is seldom performed at the present time, but no discussion of cesarean section would be complete unless it contained a brief description of its technic.

Until the child is delivered the steps of the operation are identical with those of the conservative cesarean section. In the Porro operation, however, it is not necessary to remove the placenta from the uterine cavity, since the body of the uterus is to be amputated, although this may be done if the operator prefers. As soon as the child is delivered an elastic ligature is tied tightly around the upper portion of the cervix. The infundibulopelvic ligaments are now ligated and cut through and the uterus is then amputated a short distance above the elastic ligature. A long knitting needle is now passed through the stump and allowed to rest on the abdominal walls, preventing the cervix from slipping back into the abdominal cavity, the remainder of the wound being closed by sutures in the ordinary manner. In a short time the stump and elastic ligatures slough off, leaving a depressed wound, which heals by granulation.

The operation is a simple procedure and quickly done, but owing to the long and complicated healing process necessary and the unsightly appearance of the resulting scar, which is deeply retracted beneath the proper level of the abdominal walls, it is rarely employed at the present time.

Supravaginal Hysterectomy.—The Porro operation has been practically superseded in modern times by supravaginal amputation of the body of the uterus, the tubes and ovaries being left. Practically the same

technic is employed as in the non-pregnant condition, and if the Trendelenburg position is used the operation will be much facilitated.

The child is delivered as in the ordinary conservative operation, except that, in the cases of supposed infection of the uterus, a sufficiently

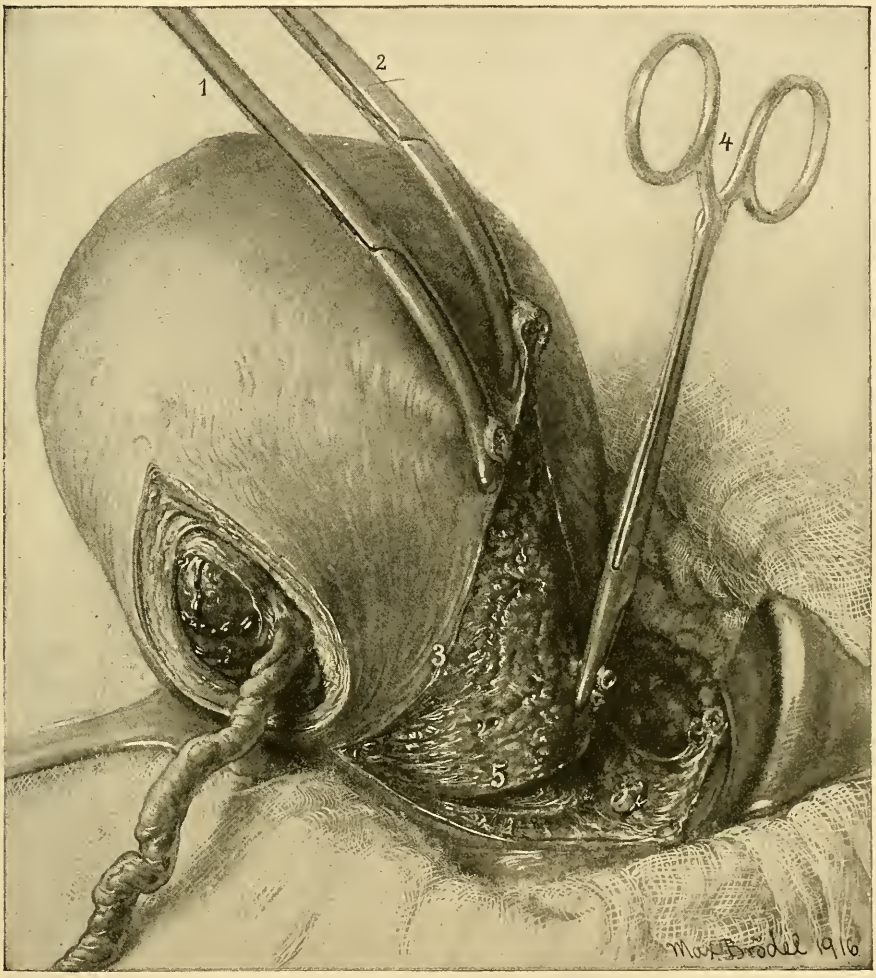

FIG. 33.—CESAREAN SECTION WITH SUPRAVAGINAL HYSTERECTOMY: TUBES AND OVARIES RETAINED: PLACENTA UNDELIVERED.

1, Round ligament clamped; 2, tube and broad ligament clamped; 3, anterior peritoneal flap; 4, uterine artery clamped; 5, incision in cervix.

long abdominal incision is made to permit the delivery of the unopened uterus from the abdomen and the complete protection of the peritoneal cavity by gauze packing, so that the danger of infection of the peritoneum by the infected uterine contents is reduced to a minimum. The placenta

is ordinarily left *in utero*. The patient is now placed in the Trendelenburg position. The tubes, ovarian, and round ligaments on each side are ligated a short distance from the uterus, clamps are placed between the uterus and the ligatures, and the tissues between the clamps and ligatures are divided. The broad ligament on either side is divided down

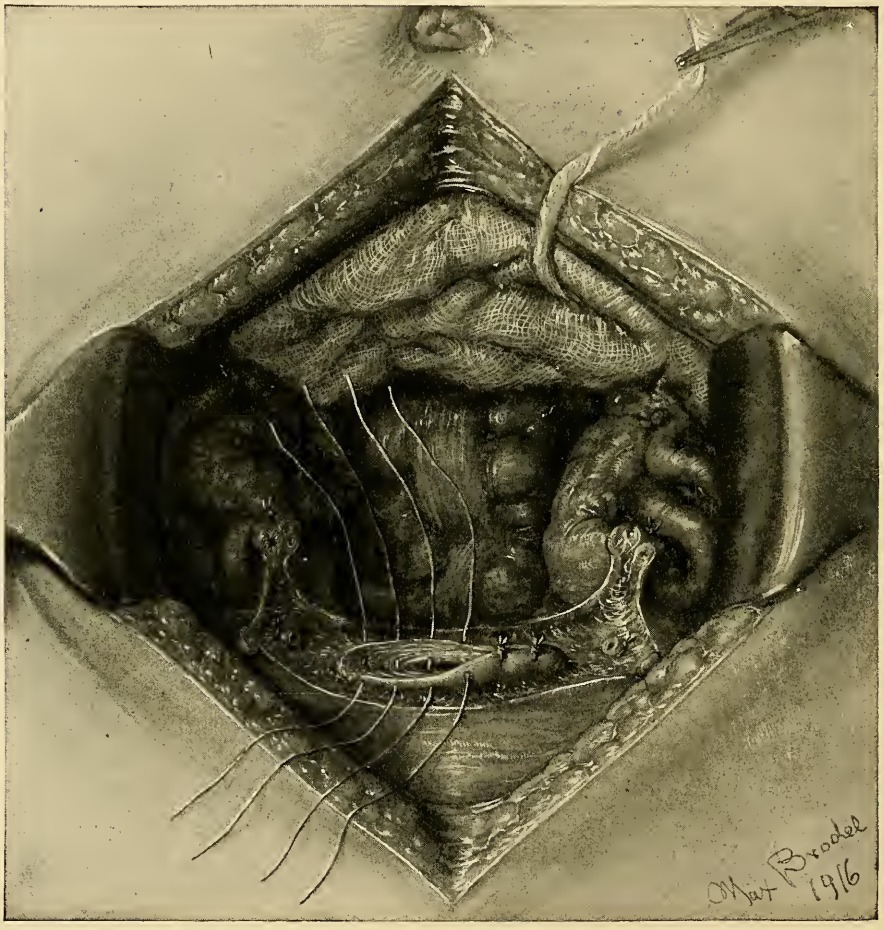

FIG. 34.—CESAREAN SECTION WITH SUPRAVAGINAL HYSTERECTOMY. Method of suturing cervical stump: tubes and ovaries intact.

to its base. A curved incision is now made across the anterior surface of the uterus just above the bladder reflection and a peritoneal flap peeled off by blunt dissection. The uterine arteries are then isolated, tied, and cut, and the body of the uterus is amputated at the cervical junction. The cervical canal is cauterized, either by the actual cautery or by crude carbolic acid, and the stump is sutured so as to close and bury

the canal by the necessary number of catgut sutures, covered by the peritoneal flap, and then dropped back into the peritoneal cavity. The broad ligament wounds are closed with continuous catgut sutures. The gauze packing is then removed and the pelvic cavity is sponged out carefully and the abdominal wound closed. In infected cases it is a wise precaution to sponge out the pelvis with 70 per cent alcohol and a small amount may be left in the abdomen.

The operation is a simple one for the operator who has had a proper surgical training and can be completed more quickly than a conservative cesarean section. The relaxed condition of the pelvic floor and the abdominal walls makes it possible to bring the upper part of the cervix out through the incision, so that the entire operation can be completed on the surface of the abdomen, instead of deep in the pelvis, as in the non-pregnant condition. In spite of the improved results which follow the extraperitoneal methods of cesarean section in doubtful cases, the danger to the patient of leaving the uterus in cases of frank infection is so great that I believe this to be the operation of election for infected cases.

Total Hysterectomy.—Removal of the entire uterus after cesarean section was first done by Bischoff. The operation is somewhat more difficult than supravaginal amputation and carries with it a distinctly higher mortality. It is, therefore, seldom done except in cases of early carcinoma of the cervix, which are considered operable, or in rare cases of infection when it is felt that retention of the infected cervix will militate against the patient's chances of recovery. As a rule, if performed under thoroughly aseptic technic, the results are satisfactory. Owing to the fact that the vaginal vault is opened, a careful vaginal preparation must be performed before the operation is undertaken.

The technic is identical with that of supravaginal amputation of the uterus, except that after ligation of the uterine arteries the vaginal vault is incised and the entire uterus removed. The opening into the vagina is now closed with catgut, the broad ligament wounds are sutured with a continuous catgut suture, and the abdomen is closed.

Some operators prefer total hysterectomy in all cases, urging the possibility of future cancer of the cervix if the cervix is left behind. Cases of cancer of the cervical stump are reported from time to time, but I feel that this danger is less than the increased immediate mortality of the more radical operation.

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CHAPTER XIII

EXTRA- AND TRANSPERITONEAL CESAREAN SECTIONS

History of Extraperitoneal Cesarean Section—Unnecessary in Clean Cases—Not Efficient in Frankly Infected Cases—Indications for Extraperitoneal Operations—Methods of Operation—Extraperitoneal Operation—Küstner's Modification—Latzko's Operation—Transperitoneal Operation—Hirst's Modification—Bibliography.

In the preceding chapters the discussion has practically been limited to the classical cesarean section with its indications and limitations, both of which it is possible to define with a reasonable degree of accuracy, and it would seem as if little more could be added which would prove of value. During the last few years, however, many operators, beginning with Frank in 1907, have been experimenting with various modifications of the operation, in the hope of widening the field of its indications by the discovery of some method by which the obvious disadvantages might be eliminated when it is performed on patients who do not come within the favorable class. These procedures aim at protection of the peritoneal cavity, so that a living child may be delivered by the abdominal route from uteri already infected, or thought to be probably infected, without subjecting the mother to the dangers which are recognized as unavoidable when the classical operation has been performed on unfit or doubtful cases. The various procedures have been designated extra- or transperitoneal sections, according to the method employed in reaching the uterus before it is incised. In the former the attempt is made to reach the lower segment of the uterus by separation of the peritoneum from its pelvic attachments, without opening the general peritoneal cavity, and to remove the child from the lower uterine segment after dissecting the bladder from its attachments to the anterior wall of the uterus; while in the latter the peritoneal cavity is opened in order to reach the lower uterine segment, but is closed by suture, clamps, or packing before the uterus is incised, in the hope that the child can be removed from the infected uterus and the uterine wound closed and buried under the bladder without contamination of the peritoneal cavity, thus diminishing to a large extent the danger of peritoneal infection. The results of these attempts have proved interesting and to a certain extent significant, but a more extensive period of experimentation is necessary before the classi-

cal operation can be considered as superseded in clean cases, although this may eventually prove to be the case.

The development of the extra- and transperitoneal operations is the result of the fact that the medical profession as a whole does not as yet appreciate that proper prenatal study of the patient in the last few weeks of pregnancy, or failing this, careful observation of labor during the first few hours, will determine in the great majority of cases what method of delivery will best serve the interests of the given patient, so that the indicated operation can be performed while the patient is still in a proper condition to render a favorable outcome almost certain.

Experience has proved that the classical cesarean section is a relatively safe operation when the rules, which have been formulated in the previous chapters, are followed, and the majority of bad results are due to a lack of appreciation of the rules, or to a deliberate disregard of them. A certain mortality, however, attends the operation, even when it is performed on patients believed to be absolutely favorable, and although at first the extraperitoneal operations were undertaken in the hope that patients who were more or less unfit for abdominal delivery might be safely operated on by these methods, various operators have discarded the classical operation within the last few years in favor of some extraperitoneal modification, in the hope of eliminating the few bad results which occur in relatively favorable cases.

The reports of series of cases operated on by one or other of the modifications of the cesarean section have been very suggestive of the fact that they may offer increased safety to the patient as well as tend toward a more comfortable convalescence even in clean cases, but as yet no series of cases large enough to be convincing has been published, since it is a well known fact that a number of surgeons have performed the classical operation successfully on series of a hundred or more patients without mortality, only to meet with misfortune eventually. Time alone can show the true merits of the newer operations and whether they deserve a permanent place among obstetric operations.

It is natural that most of the pioneer work in developing the extraperitoneal operations should have been done in Europe, owing to the conditions under which obstetric practice is carried on in most of the European countries, where the majority of parturient women are cared for by midwives, who, while they may be carefully trained in the aseptic care of normal childbirth and the convalescence following it, are not well trained in the study of the pelvis and in prenatal work. The average patient is allowed to go into labor without any attempt being made to ascertain in advance whether any disproportion exists between the child

and the pelvis, and her needs are only discovered as a general rule when labor fails, and after repeated vaginal examination under relatively poor asepsis a medical consultant is summoned. I say "relatively poor asepsis" because my personal experience leads me to believe that the asepsis of the continental surgeons does not compare favorably with that of American surgeons, and, therefore, no matter how well trained a midwife may be in other respects, her asepsis cannot be first class. It is a fact that in Germany, at least, the development of fever during labor is one of the legal requirements which necessitates a medical consultation. This, of course, means in many cases that infection of the uterus has already occurred, and if cesarean section is performed by the classical method under these conditions, the mortality is sure to be high. The bad results necessitated by such a routine naturally led to the trial of various expedients, in the hope of developing an operative procedure which would improve the statistics materially and thus greatly extend the field for abdominal delivery by increasing the safety of the patient. One method after another has been tried with varying degrees of success, until finally two distinct types of operations have been developed, either of which, in the hands of its advocates, shows distinct promise, but neither of which has yet been proven to fulfill all that has been hoped for it.

Up to the present time no method has been devised by which a child can be removed by an abdominal operation with entire safety to the mother from a uterus which is already infected by a virulent organism. Even when it has been possible to reach the uterus without opening the peritoneal cavity, infection of the peritoneum has occurred with fatal results in a certain number of cases by extension from the uterus, and since it is very common for the peritoneal cavity to be opened in spite of all precautions, direct infection is even more liable to occur. It is still too early to predict with accuracy what the final status of this operation will be, but it is doubtful if it will ever supersede cesarean section followed by hysterectomy in the patients who are believed to be frankly infected at the time of operation, although Küstner reports a mortality of only two in 112 operations by his method, and states that at least one half of his patients were in such condition at the time of operation as to render them bad risks for the classical cesarean section.

The results of other operators are less satisfactory than those reported by Küstner, and even amputation of the uterus in frankly infected cases gives a mortality of over 20 per cent. This would seem to suggest one of two things, either that the cases in Küstner's series, though doubtful risks for classical operation, were not infected with a virulent organism, or that his method of operation has very distinct

advantages over the ordinary methods employed and may eventually prove to be the operation of election for doubtful cases.

In cases in which the uterus has already been infected by a virulent organism, especially the streptococcus, no abdominal operation can be expected to give satisfactory results. In such cases cesarean section is contra-indicated, if any other method of delivery is possible, even though it may involve a destructive operation on a living child. This is especially true since experience has shown that in many cases of antepartum infection the placental vessels are invaded by the infecting organisms before delivery is accomplished, resulting in the death of the child from septicemia a few days after birth, even though it may have been in apparently good condition.

The improvement in results which has followed the abandonment of curettage as a routine procedure in the treatment of puerperal infection by the streptococcus, and the substitution of medical for surgical treatment, is suggestive of the fact that the manipulation of the uterus necessary to the performance of cesarean section by any method, which is not followed by the removal of the uterus, must result in such an increase in the process as to increase the mortality greatly. Furthermore, the opening up of extensive raw surfaces for infection must result in such a rapid spread of the infection as to make cesarean section in the face of virulent infection an exceedingly desperate operation. Removal of the uterus under these circumstances offers the best chance for the patient, if the abdominal route is selected, but even then a mortality of twenty per cent results.

In cases of infection with organisms of slight or moderate virulence better results are obtained after operation by any method, although there is little doubt but that the classical operation will give worse results than extraperitoneal section, both as regards mortality and morbidity, and in doubtful cases the latter operation is to be preferred, unless hysterectomy is considered desirable for any reason.

In cases in which there is no evidence of infection and yet the patients have been in labor for some time and have been subjected to repeated vaginal examination, even under good asepsis, the results of the classical cesarean section are only fair, the morbidity being relatively high and the mortality showing an appreciable increase over that obtained by operation at the time of election, and an extra- or transperitoneal operation, with protection of the peritoneal cavity against infection, may well be employed as promising better results.

Taking the results of the various methods together, it seems fair to conclude that in patients at the time of election the extraperitoneal opera-

tions will show little, if any, better statistics than the classical operation, and excellent results will be obtained by either method; that in cases of low grade infection or doubtful cases the results from the extraperitoneal operations will be distinctly better; and that in virulent infections no abdominal operation will give good results, but that on the whole the best results will be obtained by hysterectomy, the uterus being delivered from the abdomen before being incised for the delivery of the child, and the peritoneum carefully protected from contamination by gauze packing.

Although obstetric patients in this country are much more liable to be under the care of a physician than of a midwife, the lack of appreciation of the importance of prenatal study and selection of the method of delivery best suited to the patient before the onset of labor, is so widespread that a great majority of the patients who require cesarean section come to operation in little, if any, better condition than those under care of a midwife. The extraperitoneal section is still in its infancy here and many cases are sacrificed yearly to a combination of the lack of prenatal study plus ignorance of any method of abdominal delivery except the classical operation, the operator either not recognizing the dangers of cesarean section on unfit patients, or not being willing to sacrifice a child for the sake of saving the mother by performing craniotomy on the living child.

More is to be hoped from the education of the physicians of this country in the importance and methods of prenatal study of the patient than in any other one field in obstetrics, but it is also probable that education in operative technic and instruction in the choice of operation applicable to the given patient under the conditions which are present would largely reduce the mortality which at present exists.

Methods of Operation.—There are two general types of so-called extraperitoneal operations in vogue at the present time. One is intended to be a true extraperitoneal operation, although the peritoneum is often opened by mistake, and the other is in reality a transperitoneal operation, in which the general peritoneal cavity is protected from infection by suture of the cut margins of the parietal peritoneum to the cut margins of the uterine peritoneum before the infected uterus is opened. The latter is the easier method and will be found quicker and more simple in the average case, but the former undoubtedly protects the peritoneal cavity more completely, and, therefore, should show better results in well trained hands. The poorly-trained surgeon will find it a difficult and unsatisfactory procedure, and in cases of infection of the uterus by a virulent organism, even the uninjured peritoneum may become

infected by extension from the infected uterus, and the patient die of peritonitis, although the peritoneal cavity has not been opened. This demonstrates the fact that no method of abdominal delivery is safe in cases of virulent infection of the uterus, and, therefore, in these cases abdominal delivery is to be avoided, if delivery can be otherwise accomplished, craniotomy being the operation of choice in cases in which no other method of delivery through the pelvis is possible, even though the child may be alive. The maternal mortality following craniotomy, even on infected cases, is less than that following any other abdominal operation under similar circumstances, and the chances of the child, even if delivered by cesarean section under these conditions, are rather poor, many children dying of infection a few days after birth. Therefore, the operator should not consider the interests of the child, but should perform craniotomy, if the pelvis is large enough for the delivery of a mutilated child, i.e., if the true conjugate is above 5 centimeters.

In impossible pelves abdominal delivery is necessary and in these cases supravaginal amputation or total hysterectomy offers a better chance for the mother. This limits the field for the extraperitoneal operation to cases which belong in the doubtful class and to those in whom the conservative operation is admittedly safe.

There would seem to be little or no advantage in the extraperitoneal operation when performed on clean cases, although its advocates claim a more comfortable convalescence, and the technic of the classical cesarean section is so much simpler, while the operation allows the surgeon so much greater choice in the completion of the operation, neither hysterectomy nor sterilization being possible if the extraperitoneal methods are employed, that I prefer it in patients who are operated on at the time of election or who are felt to be uninfected.

This would seem to limit the field for the extraperitoneal operation to cases neither known to be infected nor known to be clean, but who belong in the doubtful class. In this group should be included patients who have been for a long time in labor, on whom repeated vaginal examinations have been made, especially under doubtful asepsis. It also includes patients in whom the membranes have been ruptured for a considerable length of time and patients on whom attempts at delivery have been made, even under good asepsis. In other words, extraperitoneal cesarean section is indicated in patients in regard to whom there is some suspicion that uterine infection may be present but who show no symptoms which definitely point to its existence, if the child is in good condition and shows no signs that its vitality may have been com-

promised by the efforts at delivery to which it has been subjected, whether spontaneous or operative.

According to some authorities pubiotomy is preferable in doubtful cases in which the true conjugate of the pelvis is above 7 centimeters, a rule which would limit the extraperitoneal indications still further, but pubiotomy is an operation which as yet has not been enthusiastically received by most obstetricians. Further experience, however, may show that it is a more satisfactory operation than extraperitoneal cesarean section in all except extreme cases of pelvic contraction, if no suspicion of infection exists, and that in those cases only will extraperitoneal section prove the operation of election.

Although the extraperitoneal section was first advocated by Frank in 1907, Nicholson in 1914 was able to collect some twenty modifications. This in itself proves that no one technic has been discovered which is agreed on by all operators as ideal for all patients. In general the operations may be divided into extra- and transperitoneal operations.

There is nothing to be gained by describing here each modification which the operation has undergone, and I shall merely describe what seem to me as the most satisfactory procedures of each type yet evolved.

(1) Extraperitoneal Cesarean Section.—Küstner's modification of extraperitoneal section has given very satisfactory results on appropriate cases, its originator having reported 112 cases with two deaths. According to Küstner, one half of the cases operated on were apparently appropriate for the conservative operation, and the remainder were of such a nature that he would have hesitated to perform the classical operation on them. Two deaths in 56 doubtful cases is a very satisfactory showing and suggests that the operation deserves a further trial.

The technic of the operation is as follows: The patient (who should be well advanced in labor) is etherized and the abdomen prepared. She is then placed on the operating table in the Trendelenburg position. Unless the bladder is distended with urine, 150 cubic centimeters of sterile salt solution or boric acid are introduced into the bladder. A vertical incision is made just outside the outer border of the left rectus muscle, extending 12 centimeters upward from Poupart's ligament. The deep layer of fascia is incised with care, the object being to expose, but not open the peritoneum. The reflexion of the peritoneum from the abdominal wall to the viscera and the left side of the bladder is now visible. By means of scissors and gauze dissection the left side of the bladder is dissected off from the anterior surface of the lower uterine segment and drawn well beyond the midline by a retractor. The peritoneal reflexion is

pushed upward as far as possible and the anterior surface of the lower uterine segment is exposed by retractors. An incision is made in the

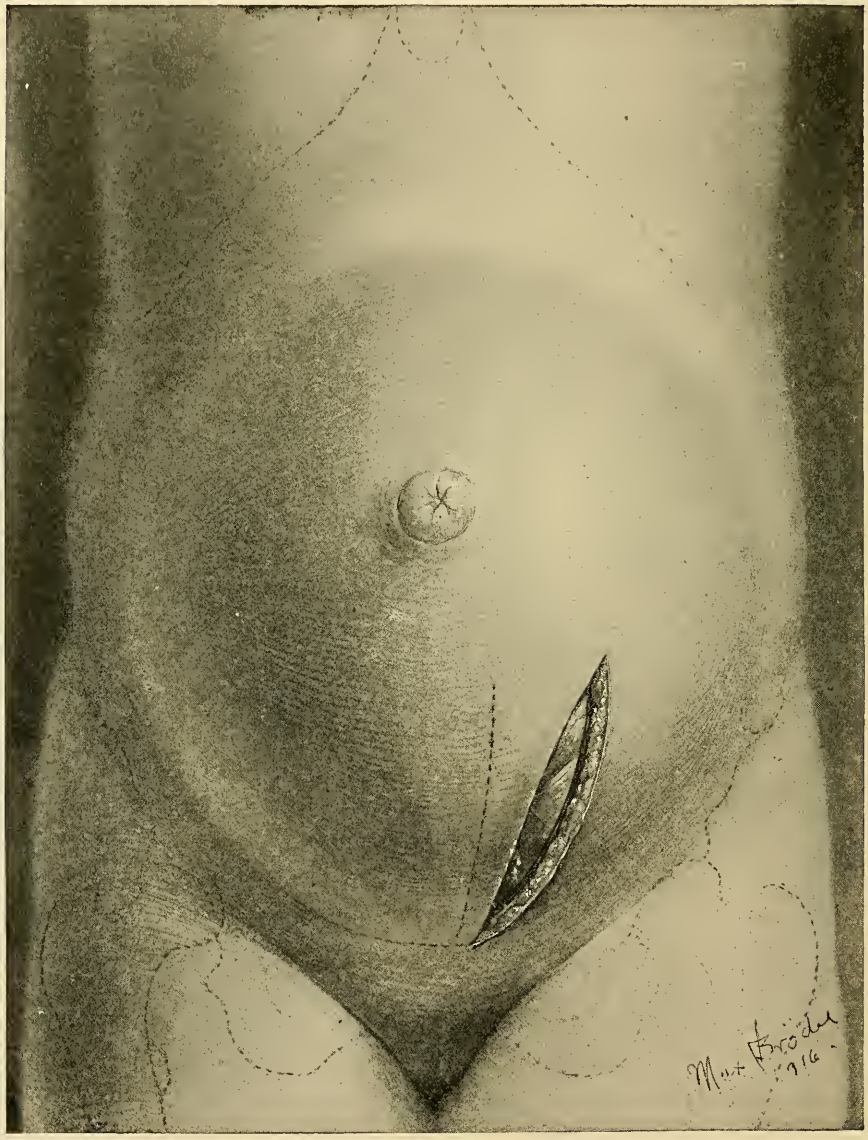

FIG. 35.—KÜSTNER'S OPERATION.
Skin incision.

midline and the child is extracted by forceps. The incision in the lower uterine segment must be very carefully made, owing to the extreme thinness of this portion of the uterus, it being never more than a few

millimeters thick, as any carelessness may result in cutting the child. The placenta is now removed, the uterine wound is closed in two layers by catgut sutures, and the abdominal wall is closed in layers, except at the lower angle of the incision, a small gauze drain being inserted into the deepest part of the wound.

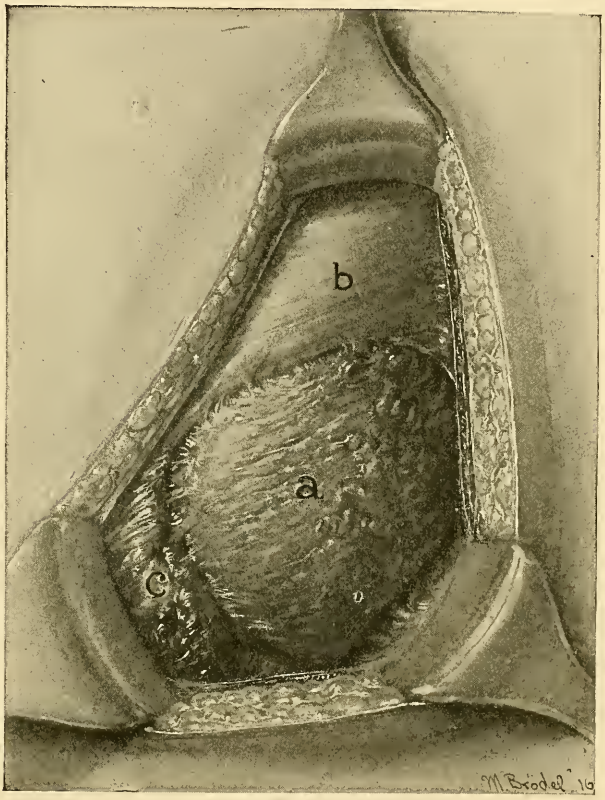

FIG. 36.—KÜSTNER'S OPERATION.

a, Lower uterine segment; b, peritoneal reflection; c, bladder drawn toward center.

The amount of hemorrhage is usually not excessive and is easily controlled. There is always some danger of injuring the bladder and of opening the peritoneal cavity, but if the dissection is made with care neither of these accidents should occur. During the separation of the bladder the left ureter and uterine artery are visible in most cases and, therefore, should be safe from injury, but carelessness may result disastrously. The employment of the Trendelenburg position during the operation is almost imperative. The operation can be performed in the

ordinary dorsal position, but the difficulties are so much increased that neither the operator nor the patient has a fair chance.

This operation is probably the best of the extraperitoneal methods, and in cases in which the propriety of the classical method is doubtful it may often prove of value, but it has certain definite disadvantages. It should not be substituted for the conservative operation in clean cases

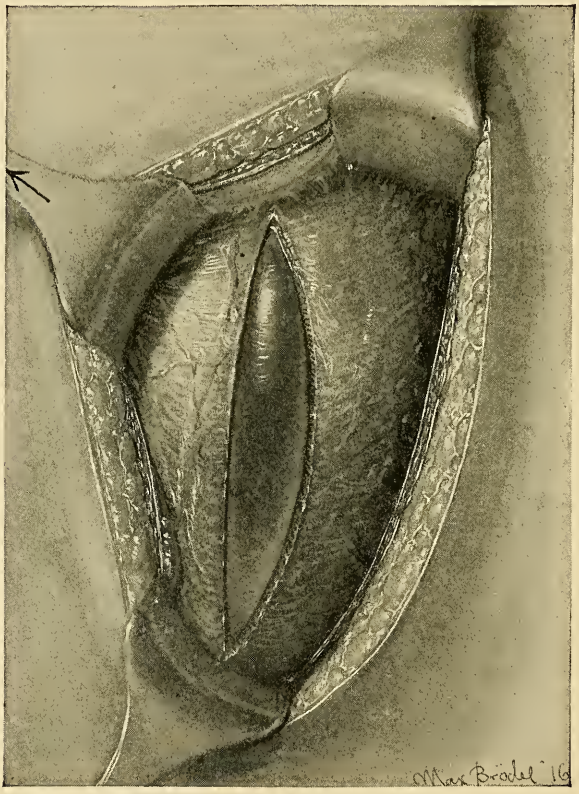

FIG. 37.—KÜSTNER'S OPERATION.
Incision in uterus low down.

and should be undertaken only by well trained surgeons; second, the bladder is sometimes injured, even in trained hands; third, the wound must always be drained, and if infection occurs, the patient must undergo a prolonged suppurative process, to which she may succumb, or as a result of which she may be invalided for a long time; and fourth, the extensive adhesions which result make its repetition impossible in subsequent labors. It is, therefore, an operation only to be done when the risks of the classical operation seem too great and yet the patient is not frankly infected with a virulent organism. Its employment in proper

cases may result in limitation of the number of cases in which pubiotomy is recommended as a substitute for a late cesarean section.

Latzko's Operation.—Although Küstner's technic seems to me to offer the best chance of reaching the lower uterine segment without undue risk of injury to the bladder or of infection of the peritoneal cavity, Latzko's operation is considered preferable by some operators. In this procedure the abdomen is opened either by a transverse or longi-

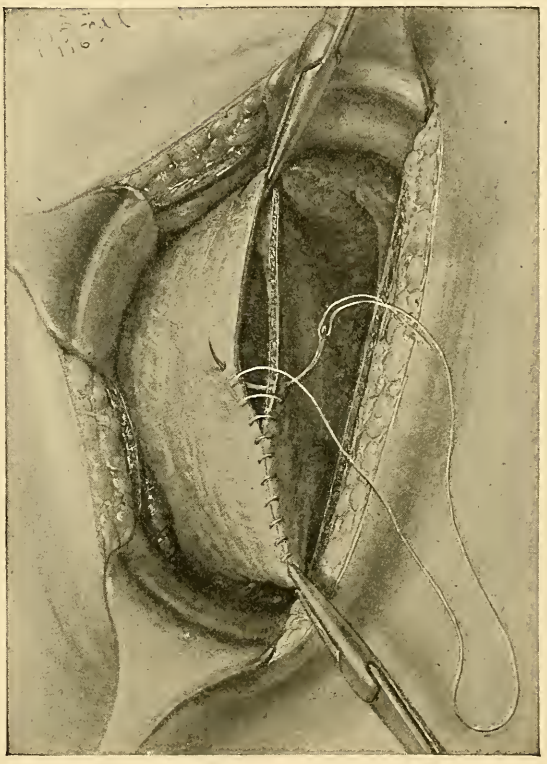

Fig. 38.—Küstner's Operation.
Introduction of uterine suture.

tudinal incision just above the pubes, carried down to but not through the peritoneum. The peritoneum is now separated from the bladder and pulled up out of the pelvis. The bladder is separated from its attachments to the lower uterine segment by gauze dissection and pushed to the right. The vesico-uterine fold of the peritoneum is then retracted upwards toward the umbilicus, leaving a denuded area made up of the lower uterine segment and upper cervix, a median incision of which affords sufficient room for the extraction of the child with forceps. The placenta is then extracted, the uterine wound sutured in two layers and

the abdomen closed. Drainage is necessary only in patients believed to be infected when operation is undertaken. The operation is not usually a difficult one, since in patients who have been for some time in labor the pelvic peritoneum can usually be readily separated from the

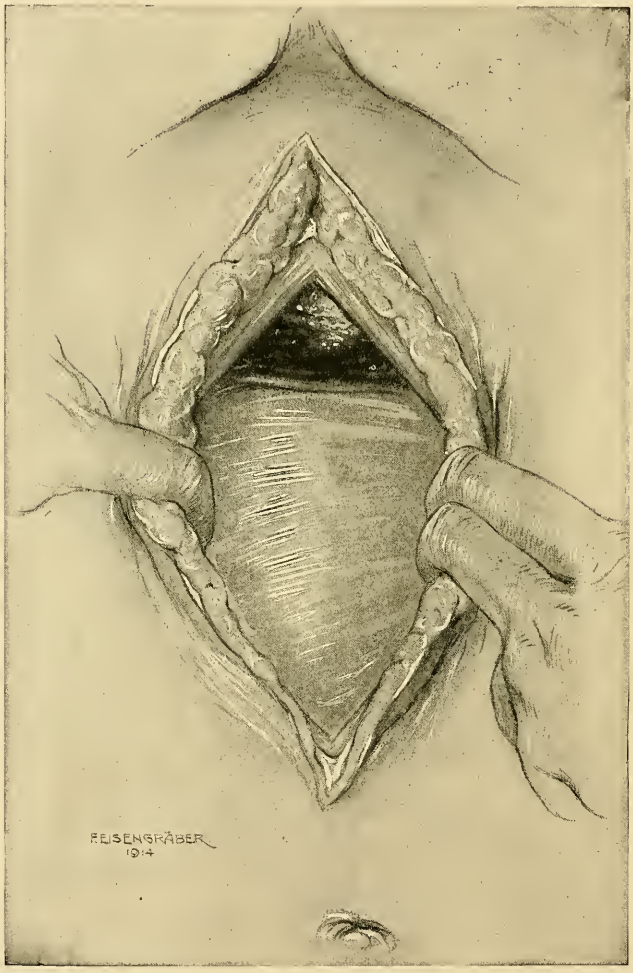

FIG. 39.—LATZKO'S OPERATION (I).

(From De Lee's "Obstetrics," copyright by W. B. Saunders.)

underlying structures, but if infection of the pelvic connective tissue occurs the convalescence will prove long and exhausting.

TRANSPERITONEAL OPERATIONS.—The difficulties of the true extraperitoneal operations, even in expert hands, have led to an attempt to devise an efficient transperitoneal operation which would give equally good results in doubtful cases. The theory of these operations is that

the uterus shall be reached by the transperitoneal route, but that before the uterus is opened the peritoneal cavity shall be protected by suture of the uterine peritoneum to the parietal peritoneum, in such a manner as to shut off the general cavity from contamination by the uterine con-

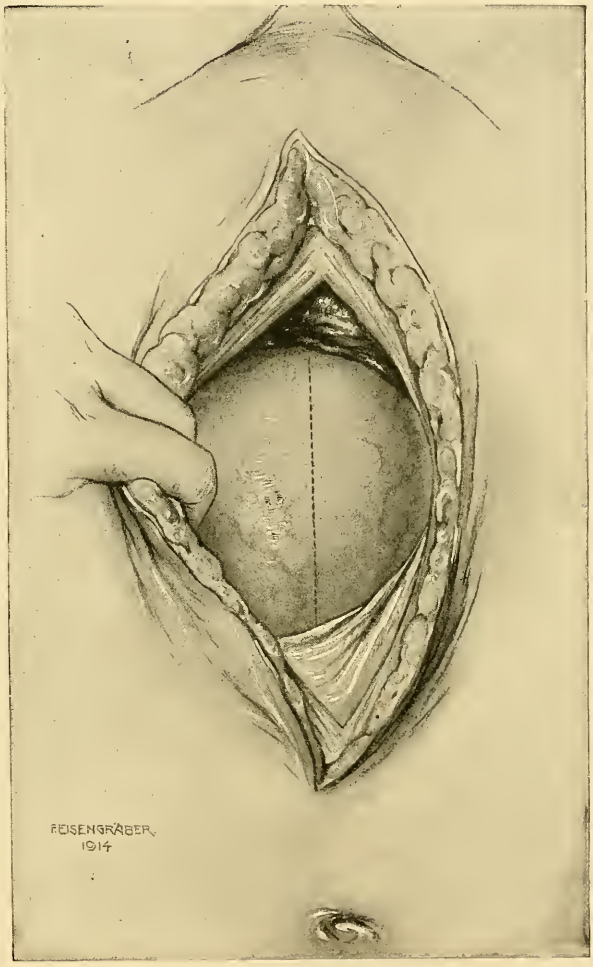

FIG. 40.—LATZKO'S OPERATION (II).

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tents, or protection may be provided in some other manner, as by gauze packing or by clamping the cut edges of the peritoneum.

The principal variations in this operation consist in minor differences in the variety of incision used, both in the abdominal wall and peritoneum and in the method of suture at the completion of the operation, which are

largely details of minor importance. I have selected Hirst's modification of the technic employed in the Veit-Fromme operations as a fair representative of the operations of this type.

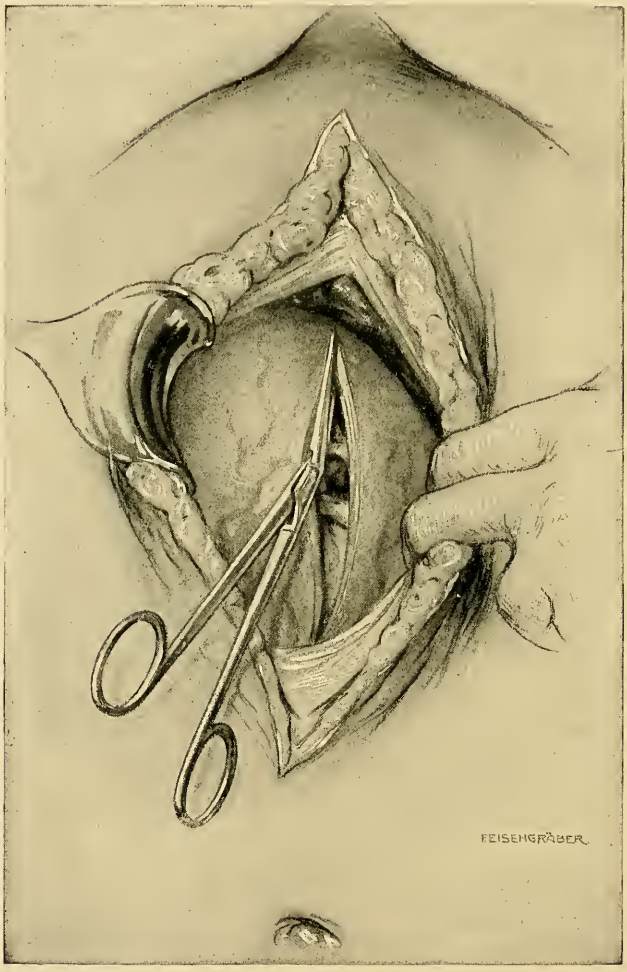

Fig. 41.—Latzko's Operation (III).

(From De Lee's "Obstetrics," copyright by W. B. Saunders.)

The abdomen is opened by a longitudinal incision from slightly below the umbilicus to the symphysis, long enough to permit the easy extraction of the child. A longitudinal incision is then made through the visceral peritoneum of the lower uterine segment, which is easily separated from the uterus, especially after several hours of labor, of the same length as the incision in the parietal peritoneum. The edges of the cut flaps of parietal peritoneum are then united by a continuous catgut

suture of the edges of the uterine peritoneum, thus cutting off the peritoneal cavity from the field of operation, unless it is torn into during the extraction of the child. A longitudinal incision is then made in the lower uterine segment and upper cervix and the child is extracted by forceps.

In the Veit-Fromme methods the peritoneal flaps are clamped until after the child is extracted, when they are sutured. The union of the

FIG. 42.—LATZKO'S OPERATION (IV).

(From De Lee's "Obstetrics," copyright by W. B. Saunders.)

peritoneal flaps not being water tight when the uterus is opened the operation can hardly be called extraperitoneal, but the late suture protects the peritoneal cavity from infection during the convalescence to a certain extent. Unless time is a great object, the Hirst modification is a distinct improvement.

After the child and placenta are delivered, the incision in the lower uterine segment is closed in layers and the peritoneum closed over it. Some operators prefer to remove the stitches closing the peritoneal

cavity and suture, first the visceral and then the parietal peritoneum, as in the classical operation, but this would seem to do away with much of the advantage gained in the primary closure of the peritoneum and to increase the danger of infection. The suturing together of the two peri-

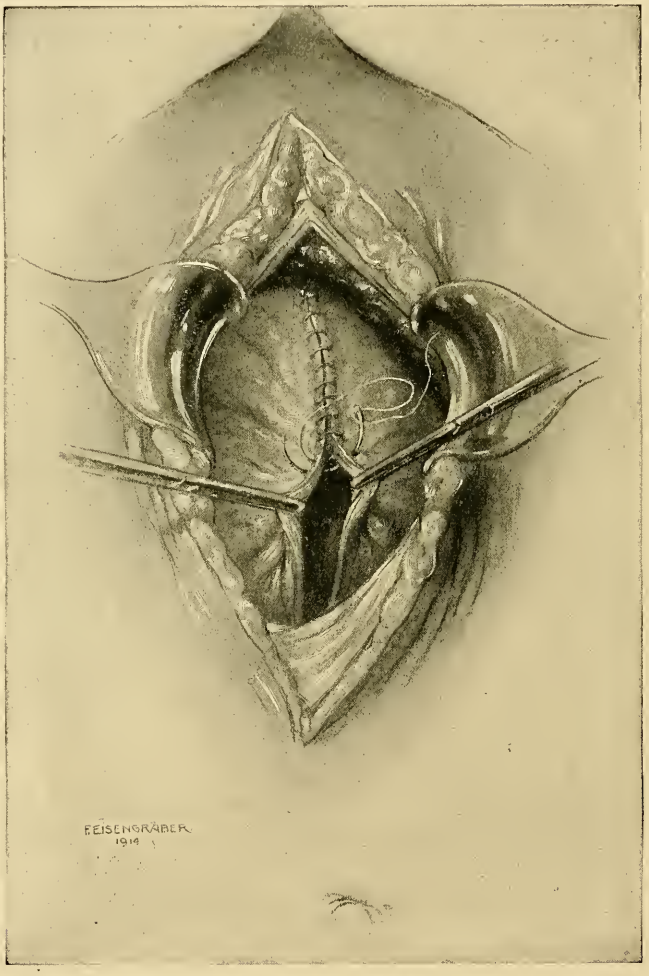

FIG. 43.—LATZKO'S OPERATION (V).

(From De Lee's "Obstetrics," copyright by W. B. Saunders.)

toneal sacs in the midline would seem to be the more logical method, and I can see no disadvantages in it.

The one objection to this method of operation which is apparent is, that the opening in the peritoneum is often not large enough to permit the extraction of the fetal head without tearing, thus opening the general cavity, and this accident has been reported several times. If this hap-

pens, the advantages of this method are largely done away with, since the opening into the peritoneal sac permits easy contamination of the peritoneum as a whole. This is to be prevented by making as large an opening as possible in the peritoneum, and, according to Hirst, suturing the peritoneal layers, as above described. After the peritoneum is closed the abdominal wall is closed without drainage.

This method of delivery possesses certain very definite advantages over the true extraperitoneal methods. First and most important is the ease with which it can be performed. Any surgeon who is properly

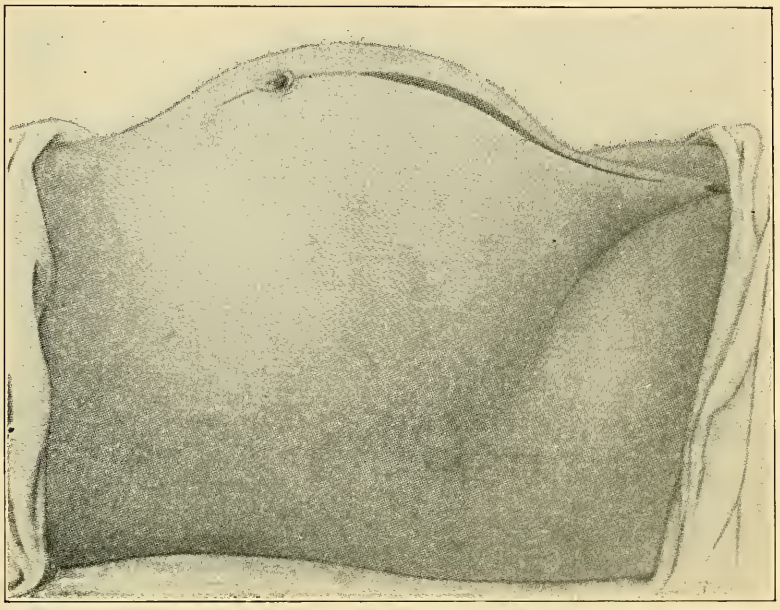

FIG. 44.—HIRST'S OPERATION (I).
Abdominal incision.

qualified to perform a classical cesarean section can do this operation when it seems desirable, a fact which does not hold true of any of the true extraperitoneal operations, which are often technically difficult and require special training on the part of the operator. It may properly be urged that cesarean section should only be performed by thoroughly qualified surgeons, but the fact must be recognized that there are in many communities surgeons who are sufficiently trained to perform a classical cesarean section in emergency, but who are not qualified to perform a more complicated operation. It is, however, unfortunately true that in such communities the need of a primary cesarean section is seldom recognized and the very type of case in which an extraperitoneal

operation would be indicated in skilled hands is the most common. This fact renders the transperitoneal section the operation of choice in such communities, although experience may eventually prove the extraperitoneal operation to be the better in proper hands.

Aside from the technical difficulties, the greatest objection to the extraperitoneal operations lies in the fact that the bladder is not infrequently injured, even by skilled surgeons accustomed to the operation,

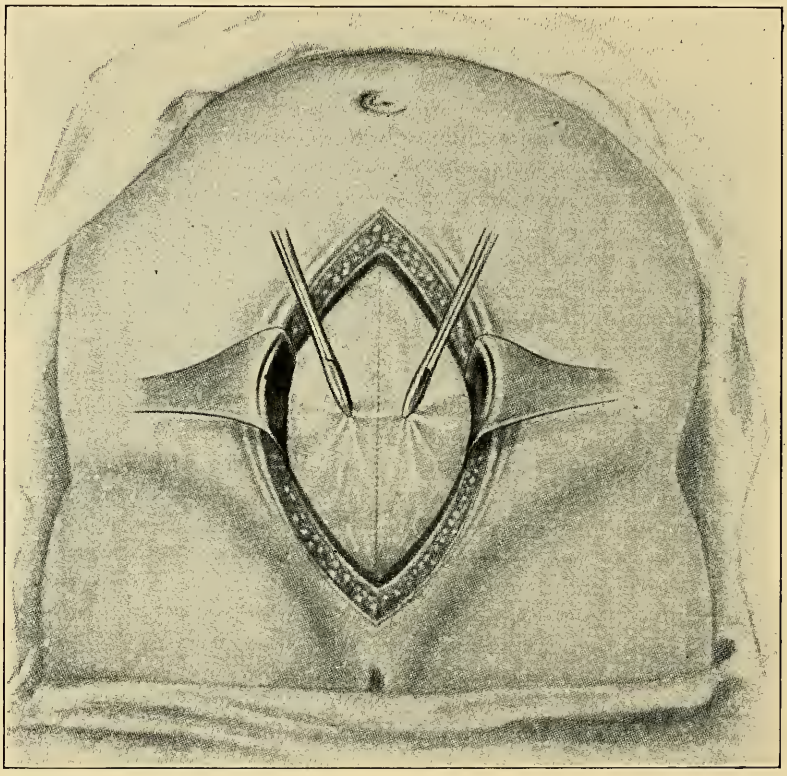

FIG. 45.—HIRST'S OPERATION (II).
Incision in parietal peritoneum.

and the ensuing complications often add greatly to the discomfort of the patient, if nothing more. This danger is avoided in the transperitoneal operations and this fact must be counted distinctly in their favor. In neither type of operation is the peritoneal cavity absolutely safe from contamination, since it may be opened accidentally when either procedure is carried out with resulting infection, or in cases of virulent infection of the uterus peritonitis and death may result from extension of the infection through the intact peritoneum, although the operation may have been perfectly performed. Another advantage of the transperitoneal

route is that drainage of the wound is unnecessary, whereas it is necessary in the extraperitoneal operation of the Küstner type, and perhaps after the Latzko operation, and drainage may result in infection of the connective tissue of the prevesical space in patients who might otherwise escape infection and result in a prolonged suppurative process, which may result fatally. Furthermore, the extensive adhesions left after the Küstner operation limit its application to a single operation,

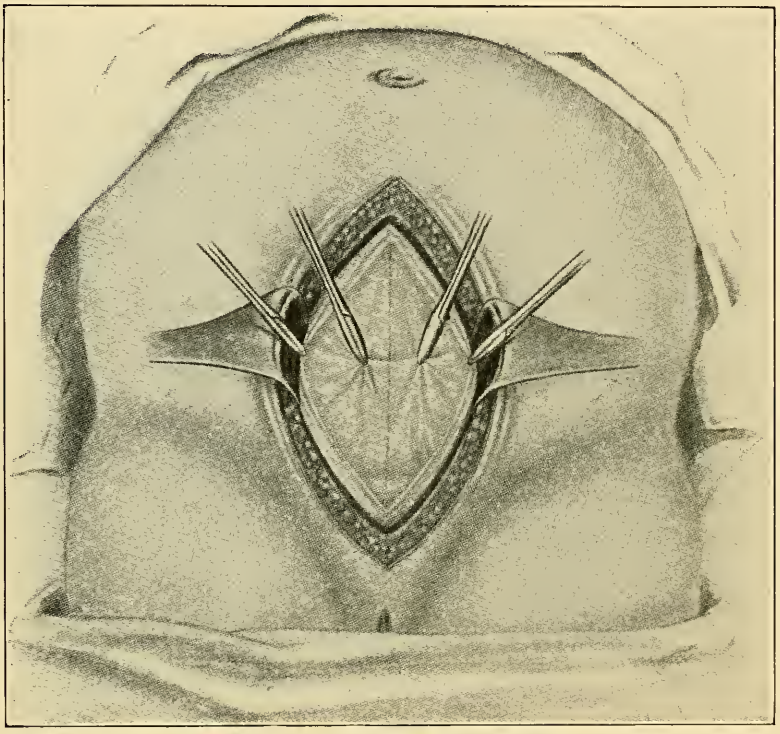

FIG. 46.—HIRST'S OPERATION (III).

Incising visceral peritoneum over lower uterine segment.

an objection which does not hold true, however, in the Latzko operation. Finally, if it is desired to render future pregnancies impossible, sterilization can only be performed at a second operation.

In the transperitoneal method the operation may be repeated in subsequent pregnancies if desired, and if it is thought best to sterilize the patient without removing the uterus, this can be done before the visceral peritoneum is opened, which obviates a second operation for this purpose and adds nothing to the risk of the operation. This contingency is hardly liable to arise, however, if the operation is limited, as I believe it should be, to those cases which, though not frankly infected, are con-

sidered poor risks for a classical operation. In these cases the best procedure, if sterilization is considered advisable, is supravaginal amputation of the uterus, since there is no advantage to the patient, except that of retaining the menstrual function, in sterilization by a method which leaves behind a probably infected uterus to act as a possible source of

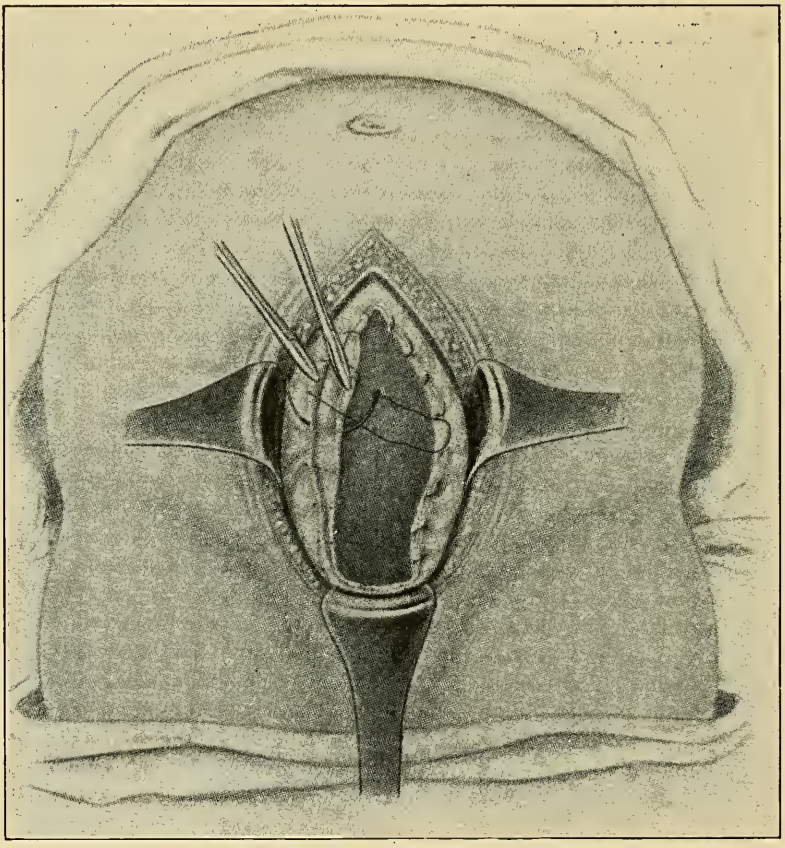

FIG. 47.—HIRST'S OPERATION (IV).

Uniting parietal and visceral flaps to close off peritoneal cavity before incising lower uterine segment.

peritoneal infection and death, and the patient's desire to retain the menstrual function should have no weight in the decision, unless the uterus is known to be uninfected, or at least believed to be so.

Neither operation is suitable for frankly infected cases, since, if the infective organism is virulent, the danger of peritoneal infection is serious, even though the general cavity is protected, and the risk to the patient in suturing the uterus and returning it to the abdomen to act as a source of infection is too great to be considered. Hysterectomy is the

only proper operation in these cases and should always be performed when cesarean section is necessary in frankly infected cases, although in patients who are in such poor condition when operation is undertaken that it is feared the shock of hysterectomy may be fatal Sellheim's operation may be done. In this procedure the uterine incision is not closed, but the margins are sutured to the skin edge, producing a uterine fistula which may be left open indefinitely or closed at a subsequent operation, when the septic infection has been overcome. A very limited experience with this operation has convinced me of its value in the type of case above mentioned, and there is reason to believe that it may prove a satisfactory substitute for hysterectomy in a certain proportion of infected patients, who object to removal of the uterus because they hope to have other children.

The principal disadvantages of this operation are that—the infected uterus not being removed—the patient must first overcome the septic process and then at a later date be subjected to a secondary operation for closure of the uterine fistula. Furthermore, it would seem probable that, if pregnancy should occur at a later date, there would be a distinct danger of rupture of the uterus during pregnancy, which might prove fatal.

There are certain types of patients for whom the classical cesarean operation is preferred, even by the most ardent advocates of the extraperitoneal operations. Whenever speed is an object the classical cesarean section should always be selected. Therefore, if the child is believed to be in any but first class condition, the quickest method of delivery should be selected. In cases in which the mother is in doubtful condition for a prolonged operation, as for instance in cardiac cases, or in cases of premature separation of the normally situated placenta, the most rapid method should be selected. In cases of placenta previa the increased vascularity of the lower uterine segment renders high incision preferable and the extraperitoneal operations have no place. In most other conditions the choice of operation depends on the personal preferences of the operator, and in clean cases with no suspicion of infection I am satisfied with the results of the classical operation and can see no reason to change to an extraperitoneal operation.

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CHAPTER XIV

PRINCIPLES GOVERNING CHOICE OF OPERATION

Objects to be Sought in Any Obstetric Case—Prenatal Study of Patient and Choice of Method of Delivery Best Fitted for Individual—Age of Patient—Size of Pelvis—Size of Baby—Advantages to Given Patient of Various Methods of Delivery—Primary Operation—Operation After Modified Test of Labor—Bibliography.

As obstetrics is ordinarily practiced, it is assumed that every pregnant woman is a good risk for childbirth until symptoms arise which call for special treatment, and these symptoms are often not appreciated until it is too late for a satisfactory result to be obtained. For the best good of our patients every woman should be looked on as abnormal for childbearing until a painstaking examination proves that her interests will not suffer, if she does not receive special care. Then, and only then should she be treated as a routine case.

The question which must always be answered in any obstetrical case is, what method of delivery is best suited to the needs of the individual patient when all the circumstances of the case are taken into consideration. In deciding this question, various factors present in the individual case must be given due weight, since the problem is a fundamental one, and the lives or future well being of both patients may depend on the conclusion which is arrived at. The rights of both mother and child must be considered on the one hand and the various obstetric procedures which are possible under the given conditions on the other, and the choice of procedure made to ensure the best results possible in the light of the obstetric skill which is obtainable and the conditions under which the patient must be delivered.

There are three objects to be sought in every obstetric case: first, the life of the mother; second, the life of the child; and third, the health of both mother and child. Any result which falls short of attaining these objects is to a certain extent a failure, at least from the standpoint of the patient, and must be considered as such, although there exists in every community a certain number of women to whom pregnancy will prove a serious menace, and who will suffer severely in health and perhaps lose their lives, unless their needs are recognized and the pregnancy is terminated at an early date. These patients, who may be classed as the

definitely unfit, must be treated according to their individual needs and the pregnancy must be ended by the most conservative method as soon as the patient can be classified, and future pregnancies must be forbidden, or better yet made impossible, if the contra-indication is a permanent one. In many of these patients abdominal hysterotomy and sterilization, even in the early months of pregnancy, offers the best method of treatment, the patient being delivered and protected against future danger from the same source at one operation, which is desirable, if such a course of treatment is considered safe for the patient.

Whenever the patient's condition is such, at the time when delivery is decided on, that an abdominal operation is not considered advisable, the pregnancy should be terminated by a vaginal operation and the sterilization deferred until some future time, in the hope that the patient's general condition may so improve in the interval as to render the completion of the procedure possible in comparative safety, the patient being sterilized as the best means of protection, and in fact sometimes apparently the only one. Sterilization to avoid the dangers of a possible pregnancy and abortion may seem radical, especially as many members of the medical profession take the ground that the patient herself must adopt such measures as are necessary to prevent pregnancy and the responsibility of failure shall rest on her and her husband. Repeated experience has shown, however, that in a certain number of cases the ordinary means of prevention fail, and the physician is faced with the responsibility of repeated abortion or of sacrificing his patient, if his medical conscience does not permit of this. In my opinion neither of these courses is justifiable, and I believe that whenever pregnancy is forbidden as being probably fatal for the patient, the only rational treatment is to render it impossible, provided the contra-indication is a permanent one.

The great majority of women, however, are perfectly good obstetric risks and can safely undergo pregnancy and labor as long as they are under efficient observation and can receive intelligent care. Every patient should be carefully studied, however, with reference to her individual needs and peculiarities, so that nothing may be overlooked which may further her interests or those of the child. It is a fact which should never be lost sight of that, although a patient is apparently perfectly normal and a favorable outcome both for mother and child may be confidently predicted, abnormalities may arise at any time which require careful attention and often prompt treatment, if a successful outcome is to be attained. Even in an apparently normal case the attendant must be prepared at any moment to depart from a policy of watchful waiting when any possible advantage may be gained for the patient by such a

course, and he must not be committed to a single method of treatment for all patients, but must be prepared to meet appropriately any situation which may arise. Probably more harm is done because the average physician is not properly qualified to recognize and meet the needs of the individual case and, therefore, treats all patients according to his own limitations, than by any other single factor in obstetrics. This inability to depart from routine practice for incipient symptoms often results in the loss of the golden opportunity for the patient, and renders necessary difficult operations in the face of serious abnormalities, which, if recognized and treated early, could have been dealt with in a simple manner without danger to either patient.

Between these classes of patients there is a large group of patients who, for one reason or another, are relatively unfit for the burdens of pregnancy and labor and who must receive careful and intelligent oversight during pregnancy to avoid disaster, since if their needs are not recognized early and met adequately, the ultimate result will be more or less unsatisfactory. At the time of labor these patients must be accorded the care suited to their individual needs, and a failure on the part of the attendant to recognize that they require special attention is often followed by an unsatisfactory recovery from the strain to which they have been subjected and more or less prolonged ill health, if nothing worse. These are the patients who must be handled with the greatest skill, since if an error of judgment is made either during pregnancy or in the selection of the method of delivery best suited for them, the result of the pregnancy will often prove a failure.

The modern improvements in operative technic have brought the obstetric art to a point where a well trained obstetric surgeon need no longer hesitate to recommend a certain course of procedure to a patient for the reason that it is not absolutely necessary in his opinion, when it is the wisest course to pursue and promises the best ultimate results, even at the cost of a slightly increased immediate risk. Every obstetrician of experience can remember patients in whom the end results have been far from satisfactory to both the patient and himself; and yet in the care of these cases no apparent indication existed for not following the traditional obstetrical rules, but he failed to recognize the special conditions which called for unusual treatment in the given case. A few such experiences are enough for any obstetrician who works with his head rather than with his hands, and his future patients should benefit by his errors of judgment; but unfortunately in most instances the unfortunate result is considered hard luck and future patients gain nothing. From the standpoint of so conducting the case that the maternal

and fetal lives were preserved the results have been successful, but we must remember that, unless the mother is brought through her labor in such a condition that she is able to resume her ordinary activities within a reasonable time, the conduct of the case has resulted in at least a partial failure, and the result argues an error of judgment on the part of the attendant, if not a lack of careful observation of his patient. Errors of judgment, if not so frequent as to show incompetence, are pardonable, but carelessness and neglect are not.

It is not enough that the patient should be studied from the standpoint of whether labor is possible or not, by determining the adaptation between the fetal head and maternal pelvis in deciding on the proper course of treatment in a given case, but also the fitness of the patient to undergo a severe strain, whether from a physical or nervous standpoint, and the probable effect of labor on a patient's after life must be estimated. The relative importance of the child in the individual case, the condition of the mother's soft parts with relation to probable injury, and the probable effect on her of the discomforts attendant on such injury, as well as the existence of any organic lesion in the mother which may be affected adversely by the strain of labor, are factors which enter into the problem in every case. All of these factors must be taken under careful consideration before the date of labor is reached and the wisest method of delivery determined on for each individual patient, so that if an operative delivery is selected in preference to a normal labor, as offering distinct advantages for the patient, it can be undertaken at the time when it promises the most nearly ideal results.

If labor has already begun before the question of the best method of delivery for the individual patient is taken under consideration, various other factors complicate the problem, since, although a certain procedure may be ideal at the time of election in a given case, it may be far from such under the conditions present when the problem is forced on the attendant, and only absolute necessity may warrant it. The length of time the patient has been in labor, the degree of progress already made as compared with the severity of labor, and the patient's reaction to labor, must all be taken into account. Physical exhaustion of the mother may contra-indicate an operation which would be unquestionably the most satisfactory for the patient at the beginning of labor. If the membranes are unruptured, the number of vaginal examinations and the probable asepsis which has been observed, as well as the condition of both mother and child, must have serious weight in the decision. If the membranes have been ruptured for some time and vaginal examination has been practised, this fact, together with the condition of the uterus, the

presence or absence of a constriction ring, and the degree of thinning which the lower segment of the uterus has undergone, must be estimated in choosing the safest method of delivery for the patient. When mother and child are in good condition the choice of operation should be such as to conserve the interests of both, except in the occasional case when preservation of the life of the child will evidently jeopardize the mother's life. In such cases the method of delivery should be chosen which will give the mother the best chance, even though it may carry with it a serious increase in the danger to the child or even deliberately sacrifice its chances. To deliberately choose an operation for the sake of the child which will add materially to the danger to which the maternal life is subjected is poor policy, for, of the two, the mother is the more important. Cases may arise in which circumstances may seem to warrant such a course, but it should never be undertaken without a full explanation of the conditions which call for a decision to both the patient and her husband, and their preferences must be given due consideration.

The environment of the patient is another factor of considerable importance. If the surroundings of the patient are such that an aseptic operation can be performed and proper after care provided, the choice of operation may be made according to the physical findings in the given case, but if the conditions are unsatisfactory for the maintenance of proper asepsis, an abdominal operation which would be advisable under other circumstances should be abandoned without hesitation, if any other method of delivery can be undertaken with a reasonable chance for the mother, even though it may involve the sacrifice of the child. Unfortunately most operators can only see one course of treatment to be followed in doubtful cases and the patient does not receive intelligent study before this course is adopted, with the result that cesarean section in general practice is attended by such a high mortality as to render it an unjustifiable procedure in many communities, whereas a careful consideration of all the factors present in the individual case would result in greatly increased safety for the mother at a moderate increase in fetal mortality.

When a patient is under observation during pregnancy there are usually several methods of delivery possible in the average case, and the patient should be carefully studied, in order to ascertain which method promises the best results under the given circumstances, the decision as to the course to be adopted being made before the patient goes into labor, if possible, subject to change, should conditions seem to warrant it before serious complications arise. In the great majority of cases it is possible to classify the patient more or less accurately after careful examina-

tion, especially under anesthesia, although it may not always be possible to say whether pelvic delivery is possible or not. It is usually fairly easy to ascertain whether the presenting part and the pelvis bear a proper relation to one another, since the pelvis can be measured and the size of the child more or less accurately estimated, and then the method of delivery will depend on the estimated character of the labor, the probable resistance of the patient to the strain of a not unduly difficult labor, the effect of pain on a nervous organization which is more or less definitely abnormal, the desirability of avoiding all strain in the given case, and the probable risk to the baby if labor is attempted.

In a certain number of cases even the best trained obstetrician will be in doubt as to the wisest course to pursue, and may feel it best to permit the patient to go into labor for a few hours and observe progress, as well as the reaction of the patient to labor, before making his final choice, the labor being carefully observed and preparations made, so that the indicated treatment may be carried out promptly when the decision is reached. Such a course gives the patient the advantage of every opportunity for careful attention, and although a prolonged test of labor renders cesarean section more dangerous than if done at the time of election, a few hours of moderate labor, the progress of which is followed by rectal examination, so that all danger of vaginal contamination is avoided, will have a negligible influence and does not eliminate it as a proper elective procedure. On the other hand, repeated vaginal examinations, or an attempt at operative delivery per vaginam, so increase the risks of abdominal delivery that the conservative section is usually contraindicated and an extraperitoneal operation should be performed, if the abdominal route is preferable for other reasons. There is no doubt but that, in cases in which the true test of labor is applied, i.e., several hours in the second stage, the results of the classical operation are unsatisfactory. In these cases, provided no evidences of uterine infection are present, the extraperitoneal operation promises much improved results and seems to be the operation of election.

Every obstetric patient should be considered as possibly abnormal and requiring special treatment until, after careful examination and consideration of the various factors present, no conditions requiring special treatment can be found. The age, physical and nervous condition of the patient, and the relative importance of the child in the given case, must be taken into account as well as the relation between the size of the child and the maternal pelvis. The probable effect of a difficult labor on the future health of the mother, as well as the probable effect of pelvic injury, must be taken into consideration and be given due weight in de-

ciding what is the wisest method of effecting delivery in the individual case, since although both mother and child may be brought through alive, serious invalidism may result from an improper choice.

Several courses are open for choice in the great majority of patients, if intelligently studied in the last few weeks of pregnancy, and the method of delivery to be employed in the given case should be carefully selected, with not only the immediate result, but also the patient's future welfare in view. Of course, in the majority of patients no abnormality will be found, of sufficient degree at least to call for any special treatment, and the patient may be allowed to go into labor with every expectation of a spontaneous or easy operative delivery; but it must be remembered that labor may prove unsatisfactory, even in the most apparently normal patient, and must be carefully supervised from the beginning, in order that no departures from the normal may escape detection at an early stage, and that appropriate treatment may ensure a successful outcome, instead of an emergency operation being rendered necessary when the patient is no longer in good condition. On the other hand, there will be found a certain number of patients who are so definitely abnormal in some way as to require special treatment. Patients who show a definite physical abnormality, whether due to pelvic disproportion, chronic or acute disease, or whether it is a result of previous operative procedures, must receive special study and the method of delivery be carefully adapted to their individual needs. It must not be forgotten in these patients that, although a normal pelvic delivery may be possible, the effect on their after health may be such as to leave them more or less seriously invalided, a misfortune which might and probably would be avoided if the proper method of delivery had been selected.

In the same category belong the patients with a lowered nervous resistance, to whom the burdens of their ordinary life are all or more than they can successfully cope with. These patients, if submitted to the strain of even an easy labor, may become chronic invalids, a misfortune which might have been avoided if their needs had been recognized and the strain of labor avoided.

These abnormal patients may be subdivided into several groups, according to their apparent needs, but it must be borne in mind that although a given patient may be classified as accurately as possible, circumstances may arise which will call for a complete change of treatment at any period of labor, and the most careful observation must be maintained not to lose the golden opportunity.

According to the estimated degree of abnormality in the given case, several courses of treatment are open: (1) The patient may be allowed

to go into labor with the understanding that, if progress is normal, a not too prolonged first stage will be permitted, and the second stage eliminated by a prompt operative delivery as soon as cervical dilatation is attained. It must be understood, however, that if the progress of labor proves abnormal, an entire change of policy may be necessary at any time, and possibly a cesarean section selected as the best means of delivery. This method of treatment will prove very satisfactory in a large group of subnormal women, in whom no pelvic disproportion is present; but if a patient who in other respects is subnormal comes to labor with an unengaged presenting part, which will either necessitate a prolonged second stage or a difficult pelvic operation, she should be reclassified at once as a poor risk for a pelvic delivery and be considered as a proper risk for a cesarean section. An unengaged presenting part in a primipara, who is in other respects abnormal, may well call for an abdominal delivery, even though examination shows that no serious disproportion exists, since, the patient already being classified as a doubtful risk, it is unwise to subject her to the strain of a labor which promises to be of more than average severity, as is the case when the presenting part is not engaged at the beginning of labor.

(2) In certain doubtful cases where the patient is perfectly normal except for a slight disproportion between the pelvis and the presenting part, which the obstetrician confidently believes will be overcome by the uterine forces, if labor is satisfactory, labor may be permitted under observation, the progress being followed by rectal examination, thus avoiding vaginal contamination in case a few hours of labor results in little progress and abdominal delivery seems to be the best solution of the problem. This is particularly true in the case of a young primipara in whom no serious pelvic obstruction can be made out, although the presenting part remains high during the early part of labor, since it not infrequently happens that a relatively difficult primiparous labor may be followed by easy labors in subsequent pregnancies, and in a perfectly healthy girl who can undergo a hard labor without serious after effects, cesarean section should be undertaken only for very definite indications, since such a course involves a similar delivery in subsequent pregnancies. In such a patient labor may be allowed to go on, if progress seems to be normal, in order to mold the head into the pelvis, on the understanding that a pubiotomy followed by forceps or version may possibly be necessary as the best method of delivery for such a patient, rather than a late cesarean section, if the uterine forces are not sufficient to mold the head into the pelvis.

(3) In other cases labor may be permitted for a few hours, in the

hope that a short trial will prove that the physical equipment of the patient is more efficient than the results of the preliminary examination would warrant, on the understanding that, if the results are anything but perfectly satisfactory, a complete change of policy will be made and the patient delivered by cesarean section, whether classical or extraperitoneal, according to the time of rupture of the membranes and the amount of vaginal interference, etc., which has been resorted to.

(4) The performance of an elective cesarean section is the method of choice in all cases in which the outcome of labor is considered seriously doubtful, whether from the standpoint of maternal health, or of fetal life. Undoubtedly the adoption of this policy will result in a few unnecessary operations, even in the most careful hands, but the results obtained in the preservation of fetal life and maternal health for the many will more than counter-balance the unnecessary operations which result from an occasional error in judgment. The present status of cesarean section is such that, under proper conditions, a favorable result may be confidently predicted when the operation is undertaken at the time of election. On the other hand, the results of labor, when definite disproportion exists between the child and the pelvic canal, are relatively unsatisfactory, both for the life of the child and the after health of the mother, since a difficult operative delivery often results in such serious injury to the maternal tissues, even if otherwise successful, as to more or less seriously invalid the patient. Under such conditions, although cesarean section may not be absolutely necessary in a considerable proportion of cases, it would seem to be the wisest method of treatment.

In a patient whose pelvic measurements are normal, or only slightly shortened, and little disproportion exists between the child and the pelvis, the choice of the method of delivery to be adopted depends on other factors. If the patient is apparently in sufficiently good physical and nervous condition to be subjected to the strain incident to a labor of rather more than moderate severity without serious after effects, even though she may not be fully up to the normal standard, labor may be permitted under observation, with the reservation that, if her powers show signs of failure before the completion of labor, operative interference will be undertaken and the baby delivered by forceps or version, as may seem best at the stage of labor she has attained, with pubiotomy or even craniotomy as an operation of last resort in case of failure of delivery by the ordinary methods. It is almost needless to say that no obstetrician would be justified, under modern conditions, in deliberately allowing a patient to go into labor with the prospect of a possible craniotomy under consideration before labor began: but it is always possible, though not probable, in

these patients whose equipment is somewhat below par, that circumstances may arise during labor to render necessary the prompt delivery of the child to save the life of the mother; and unless the patient is in a first class hospital, which might warrant a change of policy to abdominal delivery at short notice, this is not justifiable, and after failure to deliver by forceps or version, craniotomy may, in rare cases, be indicated for the benefit of the mother.

In patients whose general physical equipment is normal but in whom a moderate degree of disproportion exists between the fetal head and the pelvis, labor may be permitted with the expectation that the head will mold into the pelvis and permit an easy extraction from below, if not a spontaneous delivery. If the progress of labor is satisfactory in the early hours and if the cervix is dilating as rapidly as it should for the degree of energy expended, labor may be allowed to go on until the second stage is reached. If after a reasonable time in the second stage the head does not mold into the pelvis, even though neither mother nor child should develop urgent signs of distress, the question of delivery must be considered. The classical cesarean section in these cases does not give perfectly satisfactory results, the mortality and morbidity both being higher than at the time of election, even though strict asepsis has been observed throughout labor and rectal examinations have been substituted for vaginal examinations, the more or less exhausted patient being a relatively poor risk for abdominal surgery. The choice of operation in these cases lies between pubiotomy followed by forceps or version, extraperitoneal section, and craniotomy on a living child. The last named procedure should not be considered, unless the conditions are such as not to warrant the belief that the patient, in the surroundings in which she is placed and with the surgical skill at her command, will have a fair chance. If the surrounding conditions warrant major surgery, the choice between pubiotomy and extraperitoneal cesarean section will be made according to the training and personal preferences of the individual operator. In the hands of the average surgeon extraperitoneal section will probably give the best results.

I do not wish to be understood as advocating allowing a patient to go into labor with the idea of performing a pubiotomy or extraperitoneal section, as I distinctly prefer a classical cesarean section at the time of election, in spite of the claims set forth by the advocates of the extraperitoneal operation; but in cases of the borderline class, with a pelvis whose true conjugate is between 9 and 10 centimeters, and the child of not more than average size, the results of labor will usually be satisfactory, and if all of these patients were delivered abdominally at the

time of election, a great deal of unnecessary surgery would result and much harm might be done. It is only in the occasional case that the fetal head will be so ossified as not to mold deeply enough into the pelvis in this type of patient to permit of extraction from below. Failure of the uterine forces can usually be recognized after a few hours of first stage labor at a time when good results can be expected, if it is decided to resort to abdominal delivery after a moderate test of labor. If, however, the child is above average size, as shown by careful examination, or if the pregnancy has been sufficiently prolonged beyond the expected date to warrant the assumption of overossification of the fetal skull, the pelvic measurements cease to give information of value, and the relative disproportion of the child is an indication for an abdominal delivery before or early in labor. Many children have been lost through close adherence to a policy which insists on pelvic delivery whenever the pelvis is normal, or only slightly contracted. The important factor in these cases is the relation of the individual child to the individual pelvis, plus the other factors that cannot be discovered until a modified test of labor has been applied. If the child is overdeveloped, it furnishes just as strong an indication for cesarean section as if the pelvis is contracted.

If in patients who are submitted to the test of labor progress is not satisfactory, if the cervix does not dilate properly under the pressure of the membranes, or if, the membranes having ruptured prematurely, the head does not descend deeply enough into the pelvis to produce dilatation of the cervix, the test of labor should be abandoned promptly and the patient delivered by cesarean section before exhaustion and possible infection render her an unfavorable risk. If operation is undertaken within a few hours after the beginning of labor, and if the risk of vaginal contamination is slight or absent, the classical operation will prove satisfactory. Under opposite conditions the extraperitoneal operation will give the best results.

Whenever a patient is under consideration, in whom serious doubt exists as to the possibility of pelvic delivery, on account of marked disproportion between the child and the pelvis, the best results will be obtained by the classical section at the time of election. This will result in a few unnecessary operations, since the molding power of the fetal head can only be accurately ascertained by a prolonged test of the second stage of labor, but the benefit to the great majority of patients will more than compensate for this. The same holds true in patients who fall well below the normal standard, whether physically or nervously in whom the strain of even a comparatively easy labor may produce marked after effects.

Patients with marked heart lesions, especially mitral stenosis, or severe aortic lesions, in whom the previous history suggests danger of decompensation during labor, or in whom the effect of labor on the future health of the patient is feared, belong in this group. I feel strongly that in a primipara the strain of labor must be avoided. In multiparae with soft cervices the indication is less clear, unless sterilization seems advisable, as is the case if the patient has ever had an attack of decompensation. Even a slight test of labor may be productive of permanent invalidism in these patients, who are in the unfit class for labor, and delivery is indicated by cesarean section at the time of election, in order to minimize as far as possible the damage to the heart, which inevitably results from pregnancy and which will be much increased by labor. The classical operation is best suited to these cases, since it is quicker and easier than the extraperitoneal operations, and, therefore, is less likely to cause shock and requires a shorter period of anesthesia, and furthermore allows an opportunity for sterilization if it seems advisable.

In other patients the indication for operative delivery arises from some complication of pregnancy, rather than in some deficiency on the part of the patient which renders her a subject for the easiest possible delivery. Premature separation of the placenta, placenta previa, and severe and threatening toxemia of pregnancy are good examples of this indication.

The time of operation or indication for delivery is determined by the threatening nature of the symptoms. Whenever the symptoms are sufficiently threatening to indicate prompt delivery, no time should be lost and the patient should be delivered as soon as preparations can be made. Unless, however, as may occur in certain cases of hemorrhage, delivery may be called for at the earliest moment possible, the patient should be removed to a well equipped hospital and the operative procedure undertaken with due deliberation, since hasty operation without adequate preparation may result in saving the mother from death by hemorrhage, to lose her from infection.

The choice of method depends on the urgency of the symptoms, i.e., the necessity of avoiding all possible shock, on the condition of the soft parts, on the period of pregnancy which has been reached, and on the surroundings in which the operation must be performed. If the cervix is long and rigid, the canal not obliterated, and the patient near enough to term in placenta previa or eclampsia to warrant hope of a living child, abdominal cesarean section is the operation of choice.

In premature separation of the placenta, although there is little or

no hope for the child, the operation is indicated on the mother's account, since her condition is usually such as to render the avoidance of all possible shock advisable, and experience has proved that postpartum bleeding may in any case render hysterectomy necessary. In a certain proportion of these cases the uterine musculature has undergone almost complete disintegration from the hemorrhage which has taken place into it, and hysterectomy offers the only protection to the mother against death from postpartum hemorrhage. Delivery from below in these cases is too long and difficult a process and attended with too much shock and trauma to be advisable, the patient not being in labor, unless the surroundings of the patient are such as to militate against success if the abdominal route is selected. If, however, in placenta previa the cervix is soft and the canal obliterated, so that the stage of dilatation will be short and attended with little shock, and especially if the child is markedly small and premature, the use of a dilating bag or Braxton-Hicks version after partial dilatation of the cervix will give on the whole more satisfactory results for the mother, while the prematurity of the child renders its prognosis so doubtful that it should not be considered a factor in the choice of operation.

When a patient is first seen in consultation during labor the need for prompt operative delivery is usually suggested by one or more factors: (1) The presenting part is not engaged after several hours of labor, or is only lightly engaged, and is showing no tendency to enter the pelvis further, in spite of strong uterine contractions, which have produced a satisfactory degree of cervical dilatation. Examination, under anesthesia if necessary, in such a case will determine whether serious disproportion exists between the pelvis and the presenting part, and if operative delivery seems indicated, the method best suited for the patient can be selected after a careful consideration of all the factors in the given case.

(2) In spite of good uterine contractions the cervix remains thick and rigid, and is not dilating satisfactorily, while the presenting part is showing no signs of entering the pelvis and signs of exhaustion are beginning to appear. Such a condition shows, either that the uterine forces are insufficient for the task to be accomplished, or else some mechanical condition is present, which prevents the proper application of the forces developed by the contractions. In either case there is little or no chance of spontaneous delivery, and the problem to be settled is what method of operative delivery will prove most satisfactory, both in its immediate and remote results. If conditions are otherwise good, cesarean section in such a case is probably the best operation, but if contra-indications to

this are present, the least dangerous method of pelvic delivery should be selected.

(3) Alteration in the rhythm and character of the labor pains, which from being regular and of good character become irregular and nagging, commonly associated with increasing rigidity of the uterus as a whole and marked tenderness over the lower uterine segment. This sequence suggests uterine exhaustion and calls for prompt attention.

(4) The early appearance of signs of exhaustion developing on the part of the mother or child, which show that there is little hope that the patient can accomplish the rest of labor without help, even though progress has been relatively satisfactory up to this point, and operative delivery by the most conservative method is called for.

(5) The membranes have been ruptured a considerable time, progress is unsatisfactory and the patient's pulse and temperature are beginning to rise. This condition is always suggestive of beginning intrauterine infection and an abdominal delivery, unless followed by an hysterectomy, is a very unwise procedure.

The possibilities of operation, under these various conditions, vary from dilatation of the cervix, either manually or by the use of a dilating bag, and extraction of the child by forceps or version, to delivery by cesarean section, followed by removal of the uterus in cases in which signs of infection are believed to be present. There is no one method applicable to all cases and the choice of operation depends on the judgment of the surgeon, his familiarity with the various procedures possible, and the conditions under which operation must be performed.

It must be remembered that exhaustion alone, whether uterine or general, has a distinct influence on both the mortality and morbidity of the classical cesarean section, that every vaginal examination which has been made adds to the risk of abdominal interference, and that the less thorough the asepsis the greater the danger. The same holds true, though to a much less degree, of the extraperitoneal operations. Also, it must be taken into consideration that, if the child is in any but first rate condition, no avoidable risks for the mother are justifiable, and that, even though the child is in good condition, unless the surroundings of the patient are conducive to an aseptic operation and proper after care, cesarean section should not be considered, even though vaginal delivery may involve the death of the child.

In all cases of this sort the patient should be carefully examined under anesthesia, if necessary, the strictest asepsis being observed. The size of the presenting part should be carefully compared with the pelvis, the size of each being carefully estimated. The degree of molding which

the head has already undergone should be considered, and the further degree necessary to enable it to pass the pelvis estimated. The condition of the soft parts should be ascertained, the resistance which they will oppose to delivery estimated, and the condition of both mother and child determined. If the cervix is fully dilated or dilatable, and the head is engaged in the brim, a tentative application of high forceps may be made, to test whether the head can be brought into the pelvis. If the head advances without the use of an undue amount of force, this method should be persisted in and the child delivered. If, however, the tentative traction has no effect, the choice of operation lies between extraperitoneal section, pubiotomy followed by forceps or version, and craniotomy, the method selected being dependent on the condition of the child and the question of uterine infection of the mother. If the child is in any but excellent condition, or if the mother shows signs of infection, pubiotomy is contra-indicated and craniotomy offers the best chance for the mother. It may be that, in a case of this sort, the family may demand cesarean section for religious or other reasons, in spite of the danger to the mother, and in this case either an extraperitoneal section may be performed, if no definite evidences of uterine infection are present, or a supravaginal amputation of the uterus following cesarean section, if such evidences are distinguished. If definite evidences of probable infection are present cesarean section by any method offers so great an increase in the danger to the mother that only the most urgent reasons for obtaining a living child warrant its performance, and even then the dangers must be thoroughly explained to both parents, so that they may have an opportunity to decline the risk.

When examination shows that, in spite of prolonged labor, the presenting part is not engaged and the cervix is still largely undilated and rigid, the choice of operation depends on the estimated disproportion between the head and the pelvis and the condition of mother and child. As a general rule in these cases, when there is marked disproportion between the head and the pelvis, delivery from below will be difficult, both for this reason and on account of the rigid undilated cervix. If both patients are in fair condition and there is no definite evidence of infection, an extraperitoneal cesarean section is the operation of election. If the child is in poor condition, dilatation or incision of the cervix, followed by craniotomy, is the safest procedure for the mother, unless there is evidence of a virulent infection, or the pelvis is extremely contracted, i.e., with a true conjugate of less than 5½ centimeters, or the child is unusually large.

If in such a case there is definite evidence of infection, incision of

the cervix is contra-indicated, and the only operation which offers even a fair prospect of success, in case the cervix is too rigid for manual dilatation, is cesarean section followed by removal of the uterus, and at the best in such a case the prognosis is doubtful, the mortality being in the neighborhood of 20 per cent.

In frankly infected cases the best chance for the mother, when marked disproportion exists between the pelvis and the presenting part, is cesarean section followed by hysterectomy, unless the soft parts are in such a relaxed condition as not to seriously complicate delivery by craniotomy. Craniotomy on an infected patient is not without risk, and from 8 to 10 per cent of these patients die as a result of the infection. In the cases which require a difficult manual dilatation or incision of the cervix, before the craniotomy can be performed, the risk is much greater and abdominal delivery followed by amputation of the uterus is probably safer for the mother and offers the only chance for the child.

It is impossible to consider in detail all the complicating conditions which may enter into the problem, but this brief summary will serve as a general guide to treatment. A routine cesarean section in all late cases of complicated labor will probably prove more fatal to the mother than the routine adoption of any other single method. Many lives are sacrificed yearly because cesarean section is widely adopted as the easiest way of meeting complicated situations, without regard to the fact that the prognosis of the operation grows steadily worse with every hour of active labor to which the patient is subjected, and that every vaginal examination also increases the risk, even though the asepsis is beyond reproach. A thorough study of each individual patient and the adoption of the method of delivery best suited to her needs and the circumstances of the case will do much to improve the results; but as long as the majority of obstetric cases are cared for by men who are not interested in obstetrics and who have not been trained in the care of complicated labor, the results will never be satisfactory, and many mothers and children will be sacrificed unnecessarily. Until the medical profession realizes the importance of prenatal care and is willing to admit that no man can do intelligent obstetrics unless he has taken special training to fit him for the work, the results will continue to fall far short of what they should be. It is also necessary that the attendant should be willing to admit the fact that his ability to perform cesarean section, although his training may not be sufficient for him to know whether cesarean is the best method of delivery for the patient or not, is not a sufficient indication for subjecting the patient to this operation, since otherwise cesarean section is almost as much of a menace to the parturient woman as a benefit.

Extraperitoneal cesarean section promises well in cases in which the classical operation seems a doubtful expedient on account of the dangers of infection. It is not, in my opinion, to be substituted for the classical section in clean cases, although future experience may demonstrate that it has very definite advantages, except when speed in delivery is indicated for any reason, or when, as in placenta previa, the lower uterine segment is so vascular as to render a low incision inadvisable.

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CHAPTER XV

VAGINAL CESAREAN SECTION

Vaginal Hysterotomy Better Name for Operation—Indications—First Three Months of Pregnancy—Second Three Months—Last Three Months—Technic of Operation —Bibliography.

It is rather unfortunate that the term vaginal cesarean section should have been applied by common usage to the operation which is better known as vaginal hysterotomy, since this misuse of the name cesarean section sometimes causes a certain amount of confusion in regard to the nature of the operation.

True cesarean section predicates the delivery of the child through an incision in the abdominal and uterine walls, and the operation is indicated in patients in whom some condition exists which renders delivery through the pelvis impossible or undesirable for one or both patients.

Vaginal hysterotomy, on the other hand, is an operation by which the cervix and lower segment of the uterus are incised per vaginam sufficiently extensively to remove the resistance of the cervix as a factor in opposing delivery, which must then be accomplished by further operative means, i.e., by forceps, version, or craniotomy, according to the indications in the given case. The abdominal cavity is not opened in this operation, except by mistake, and it is simply a procedure to secure sufficient cervical dilatation to permit delivery, which must be accomplished by some other operative procedure.

The use of the term cesarean section, even though qualified as vaginal, leads to the erroneous supposition that the two operations may be used interchangeably, whereas they are employed in entirely different classes of patients for different reasons, and the fact that one of them may be indicated in a given case practically means that the other is not a proper procedure under the conditions which are present, each possessing certain advantages under certain circumstances which renders it the preferable operation for the individual patient.

Indications for Vaginal Hysterotomy.—Incision of the cervix, rather than dilatation, may properly be employed in any case in which the necessity for delivery is urgent and the cervix is too rigid to permit of rapid manual or instrumental dilatation without danger of serious in-

jury to the soft parts, or when the attempt to induce labor by the use of bougies or dilating bags has been made and proved a failure and the symptoms preclude further delay. It is not an operation of election in patients in whom the cervical canal is obliterated and the margins of the external os are not rigid, since in these cases manual dilatation is ordinarily a preferable procedure; and it should never be undertaken in patients who are supposed to be infected, since in these cases the results are extremely bad, owing to the fact that the extensive wound surfaces produced in the operation are sure to become infected, exposing the patient to the exhaustion of a prolonged septic process, and, in case of a virulent organism, to probable death from the increased absorption.

In early pregnancy vaginal hysterotomy is particularly adapted for use in cases in which abortion is urgently indicated and the cervix is entirely unprepared and rigid. This will be found particularly true in patients with serious heart lesions who must be aborted to save their lives, and in patients who are bleeding to a dangerous degree and in whom the rigid cervix renders a rapid dilatation impossible. In these cases the trauma which results from attempts to dilate the cervix and from the prolonged anesthesia often necessary may prove the final factor in causing the death of the patient, whereas, rapid incision of the cervix and emptying of the uterus may give the patient a chance for recovery.

The operation is, as a rule, more likely to be necessary in primiparae, especially in women with long conical cervices, the dilatation of which may prove extremely difficult and prolonged, and in whom the use of the dilating bag is apt to prove unsatisfactory, however valuable it may prove at times in multiparae, in whom the cervix is rigid on account of scar tissue resulting from laceration, operative procedures, or previous inflammations. It is an operation which is ordinarily easy in properly selected cases, but it is not suited to the untrained surgeon, since not infrequently it is an operation which will thoroughly test the skill of the most expert surgeon, especially if attempted on unfit cases.

It may be called for in early pregnancy in cases of pernicious vomiting, in which the cervix is rigid and the condition of the patient demands the most conservative method of emptying the uterus, i.e., the method which shall produce the least shock and the shortest period of anesthesia. If the cervix is at all rigid, vaginal hysterotomy is the best method of securing rapidly the necessary degree of dilatation to permit of thorough emptying of the uterus. The same holds true for other conditions which call for a prompt termination of pregnancy in the early months, such as cardiac lesions with beginning failure of compensation, or inevitable

abortion associated with profuse hemorrhage in a patient with a rigid cervix.

Cervical dilatation by the ordinary methods in cases of this type is a long drawn out process, and it is often impossible to obtain sufficient dilatation by them to permit the passage of the finger into the uterus to remove the ovum, and in cases in which a rapid evacuation of the uterine contents with the least possible shock is advisable, vaginal hysterotomy may prove a life saving operation.

During the middle three months of pregnancy the indications for vaginal cesarean section are practically the same as in the early months. Any condition calling for prompt delivery in a patient with a long rigid cervix will be more successfully treated by this operation than by a prolonged difficult dilatation with its inevitable trauma. The only operation which comes into conflict with it under these conditions is abdominal hysterotomy followed by sterilization in patients who present a permanent contra-indication to pregnancy and labor, such as severe heart lesions or chronic nephritis. Since repeated abortion is not to be considered in such cases, an operation which will render a patient sterile as well as save her life at the same time is to be preferred to an operation which simply ends the pregnancy, if the condition of the patient is such as to render a laparotomy justifiable.

During the last three months of pregnancy prompt delivery may be called for at any time on account of various conditions, especially severe toxemia which does not yield to treatment, placenta previa, premature separation of placenta, or cardiac complications with failing compensation. Induction of labor by means of a dilating bag or abdominal cesarean section will ordinarily prove to be the best methods of terminating pregnancy in the majority of such cases, the choice depending on the estimated rigidity of the cervix, the urgency of the symptoms, and the size of the child. As a general rule in patients near term, in whom the cervix is long and rigid, abdominal section will give the best results for both patients, but if the cervix is apparently of normal consistency, if the child is markedly premature, and if the symptoms are not immediately urgent, the use of the dilating bag will prove the more satisfactory. If, however, the symptoms are too urgent to permit the use of a bag on account of the delay involved in this method of inducing labor, or the child is more than six weeks premature and the cervix is rigid, vaginal hysterotomy becomes the operation of choice. It is also to be preferred to abdominal delivery in cases in which the bag has been employed and found ineffective, since the danger of infection, if the patient is delivered through the abdomen after the intra-uterine manipulation necessary to

the employment of a bag, is so great as to practically contra-indicate the abdominal operation, unless it is followed by hysterectomy, and in these cases vaginal hysterotomy, even at or near term, becomes the operation of election for the trained surgeon; although if infection of the uterus has taken place, the results will not be satisfactory, and no cutting operation is advisable, if other means of accomplishing delivery are possible.

The operation becomes more difficult the nearer to term the patient, and I prefer not to undertake it in the last four to six weeks of pregnancy, if it can be avoided. Previous to that time, especially before the child is viable, the use of a bag, even in cases with fairly marked rigidity, and vaginal cesarean section in case the bag fails to produce satisfactory dilatation, are preferable to an abdominal delivery. If, however, the symptoms are too urgent to permit of the necessary delay appertaining to the use of a bag, the choice must lie between vaginal and abdominal cesarean section, the former being preferable up to six weeks before term, and the latter in the last month of pregnancy. The two weeks not covered are debatable ground, and either operation may properly be performed, according to the judgment of the individual operator and the conditions present in the individual case.

Technic of Operation. The operation of vaginal hysterotomy was first described by Dührrsen in 1896 as a better procedure than the divulsion of the cervix by means of the Bossi or other metal dilator, or the difficult manual dilatation of a rigid undilated cervix, and it is not too much to say that time has justified Dührrsen's claims. The vagina is prepared as usual for operation and the rectum and bladder are emptied. Full anesthesia is necessary for a successful operation. A heavy traction suture is then introduced through either side of the cervix which is drawn down as close as possible to or even outside the vulva, or, if preferred, the traction may be made by seizing either side of the cervix with a French hook, though this method is more likely to damage the cervical tissues severely. If the cervix cannot be brought down to the vulva, the difficulties of operation are much increased. A longitudinal incision is then made through the anterior vaginal wall from a little above the urethra to the external os (Fig. 48). The bladder is then separated from the anterior surface of the cervix and lower uterine segment by blunt dissection, preferably with the gloved finger covered by a piece of gauze, at first by touch alone; but later a large retractor is introduced into the wound and the separation is completed under the guidance of the eye. The bladder is drawn up behind the retractor, thus exposing the whole anterior wall of the uterus from the anterior lip of the cervix to the contraction ring with a pair of heavy, straight scissors. A median in-

cision is now made about 10 centimeters long, extending from the margin of the external os to practically the level of the contraction ring. The speculum is removed, one hand is introduced into the uterus, the membranes are ruptured, and the child turned and extracted. If the child is dead or non-viable, it is a wise precaution to perforate the head and

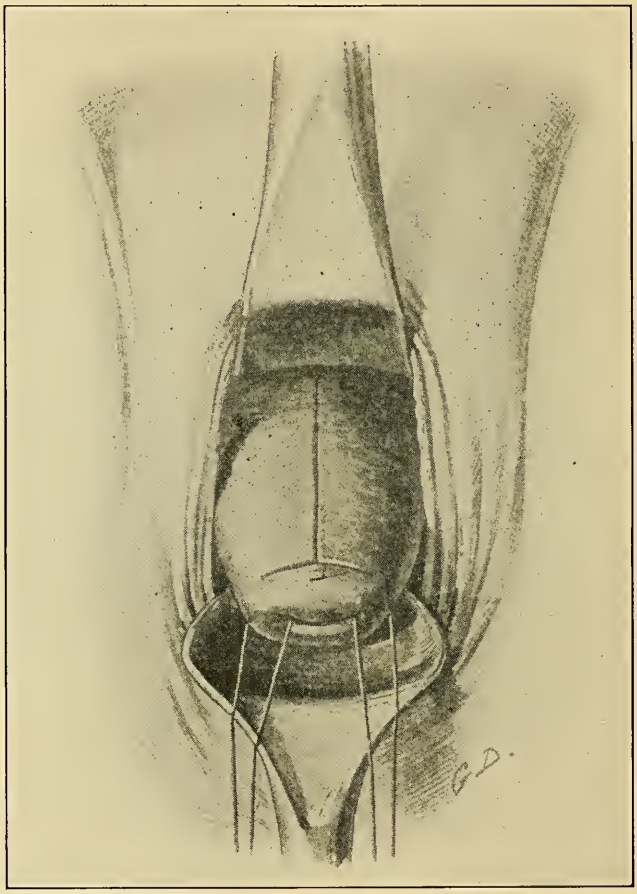

Fig. 48.—Vaginal Hysterotomy.

thus render extraction of the after coming head more easy, since the smaller the head the less the liability of damage to the uterus in case the incision is too short. The placenta is extracted manually and the operation is completed by suturing the wound.

Traction on the sutures introduced at the commencement of the operation, or on the French hooks, will now bring the whole uterine incision into view as a triangular opening, and it is readily closed from above downward by interrupted sutures of chromic catgut, which are intro-

duced, under the guidance of the eye, care being taken to place the uppermost stitch just above the upper angle of the wound. The incision in the vaginal mucosa is then closed by a continuous catgut suture. Some operators prefer to introduce a small rubber drain into the dead space which always remains between the bladder and the vaginal mucous mem-

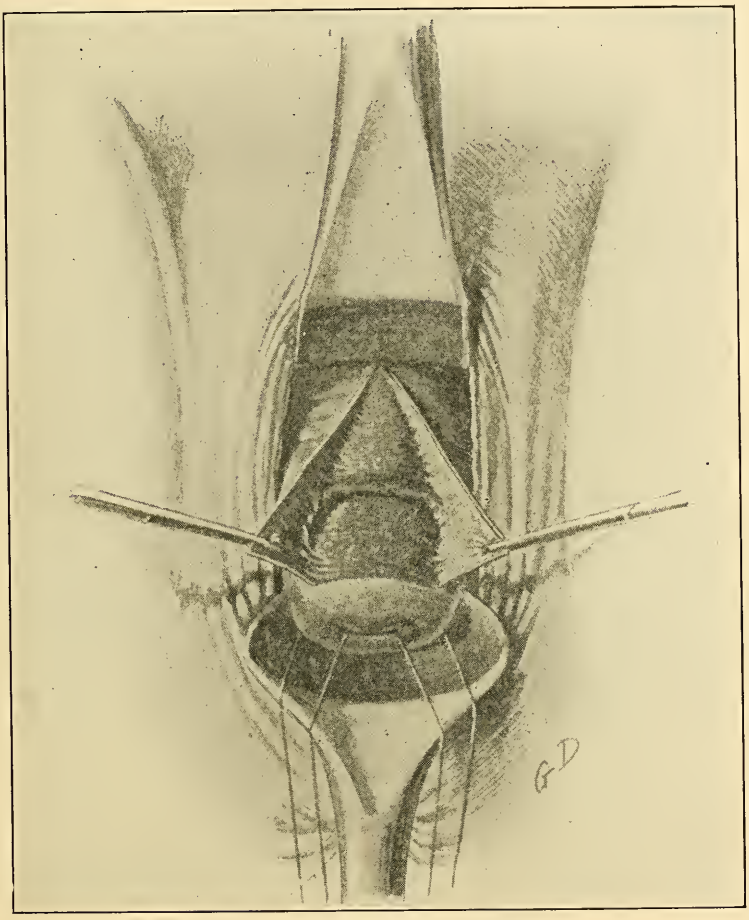

FIG. 49.—VAGINAL HYSTEROTOMY.

brane, to prevent the formation of an hematoma, which may become infected and cause symptoms. This is usually unnecessary, however, unless there is free venous bleeding present and it is not possible to find and ligate the bleeding vessels.

This anterior incision affords sufficient space for the extraction of an average sized child up to the eighth month of pregnancy, but after that time, or in case of an unusually large child, a posterior incision should also be made. In this case the operation is begun by a transverse incision

to, but not through, the peritoneum, in the posterior fornix at the cervical junction, the peritoneum being peeled off from the cervix and lower uterine segment, which is then incised in the middle line for a distance of 5 centimeters, after which the anterior incision is made as described. This posterior incision is necessary in cases operated on near term to

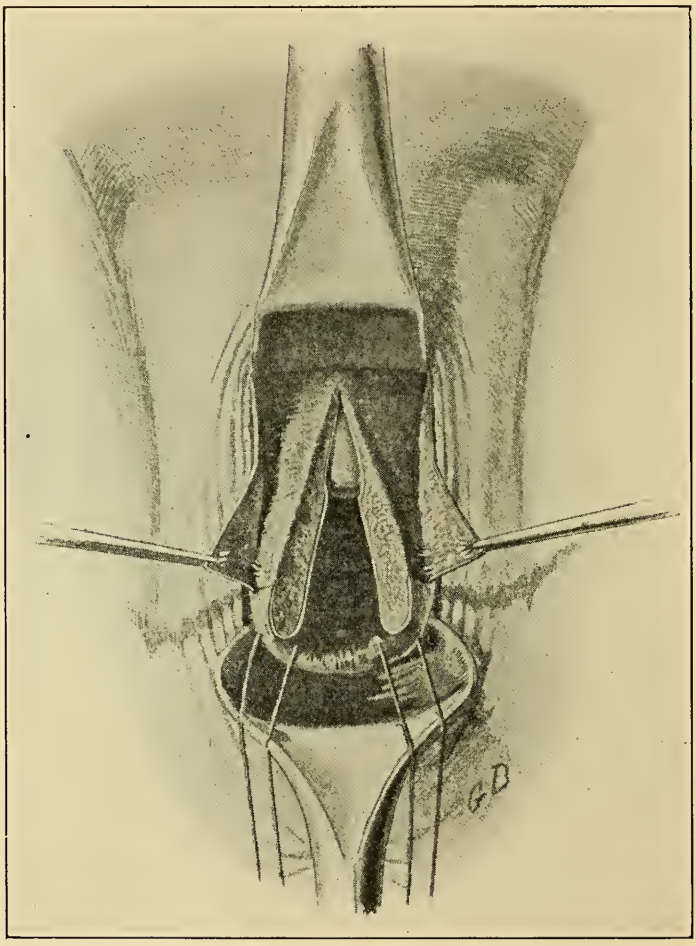

Fig. 50.—Vaginal Hysterotomy.

allow room for the passage of the full term head, the smallest circumference of which is 32 centimeters. Otherwise an anterior incision of 15 or 16 centimeters would be necessary to permit passage of the head without such tearing at the upper end of the incision as would open the peritoneal cavity. With the double incision neither need be so long. The posterior incision is closed first and then the anterior, as described above.

In the hands of a trained operator this operation permits delivery of

the child in a few minutes and the whole operation can be completed in thirty minutes or less. Aside from the rapidity with which the operation can be performed and the consequent reduction of shock, it possesses definite advantages over instrumental or manual dilatation, in that it leaves a clean cut wound properly united by sutures, instead of a deep

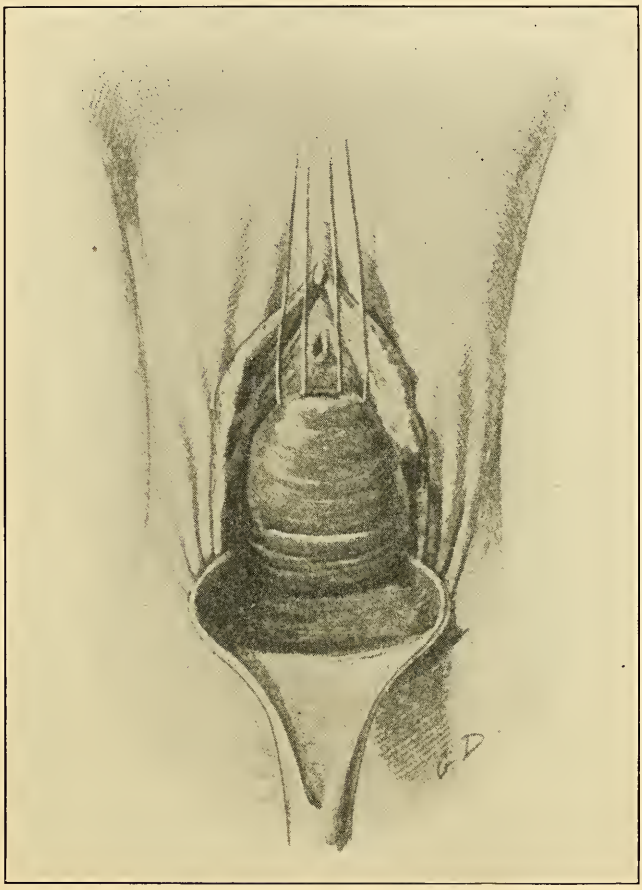

Fig. 51.—Vaginal Hysterotomy.

irregular cervical laceration, often extending into the lower uterine segment, which it may prove impossible to repair properly. If the incision is carefully made in the median line the amount of hemorrhage is usually very slight, but if the incision deviates to either side hemorrhage may be severe.

The ease of operation is distinctly compromised, if the speculum employed is too small to give a proper view of the field of operation, or if the incision is too short or not in the midline of the uterus. In the latter

case the hemorrhage may be profuse, owing either to laceration at the upper angle of the incision during extraction of the head, or to injury of the large vessels which lie at the sides.

There is a distinct tendency to relaxation of the uterus and post-partum hemorrhage after the operation, and it is distinctly a wise pre-

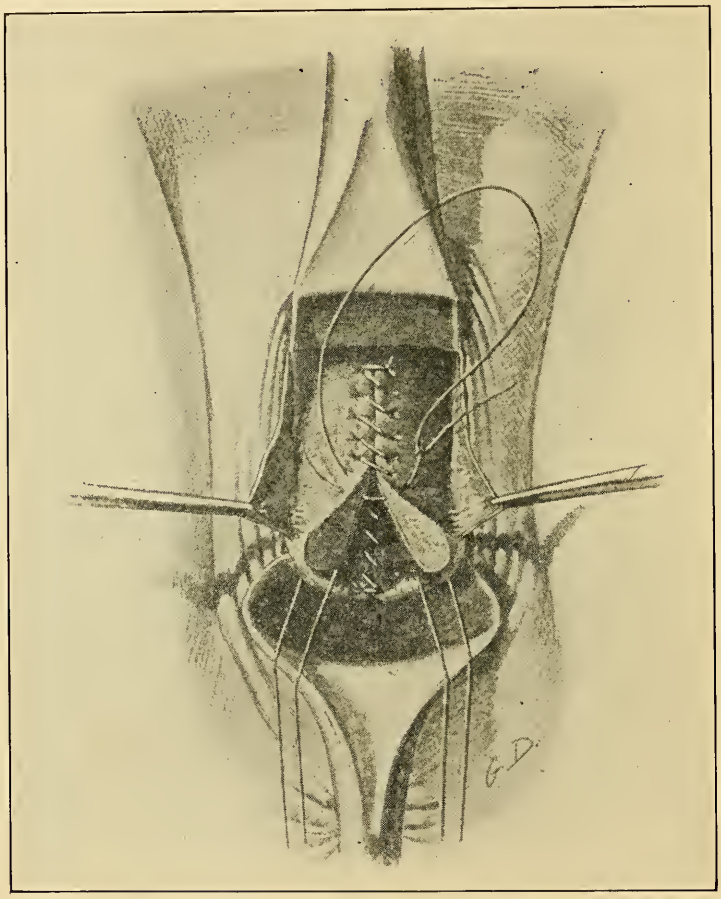

FIG. 52.—VAGINAL HYSTEROTOMY.

caution to pack the uterus before suturing the anterior wall, although in many cases it is unnecessary.

Dührrsen's suggestion that the operation could be made more simple and easy by introducing a medium size dilating bag into the uterus, which is filled with sterile saline solution and used as a tractor, is of some value in difficult cases. This acts as a guide to the length of the incision necessary for the delivery of the child's head, the anterior wall of the lower

uterine segment being incised until the bag slips out, thus minimizing the risk of attempting to deliver through too small an opening.

One of the greatest difficulties in the operation lies in the fact that, in occasional case, it is impossible to bring the cervix to the vulva, and if the vagina is narrow and rigid, this may render the operation very difficult,

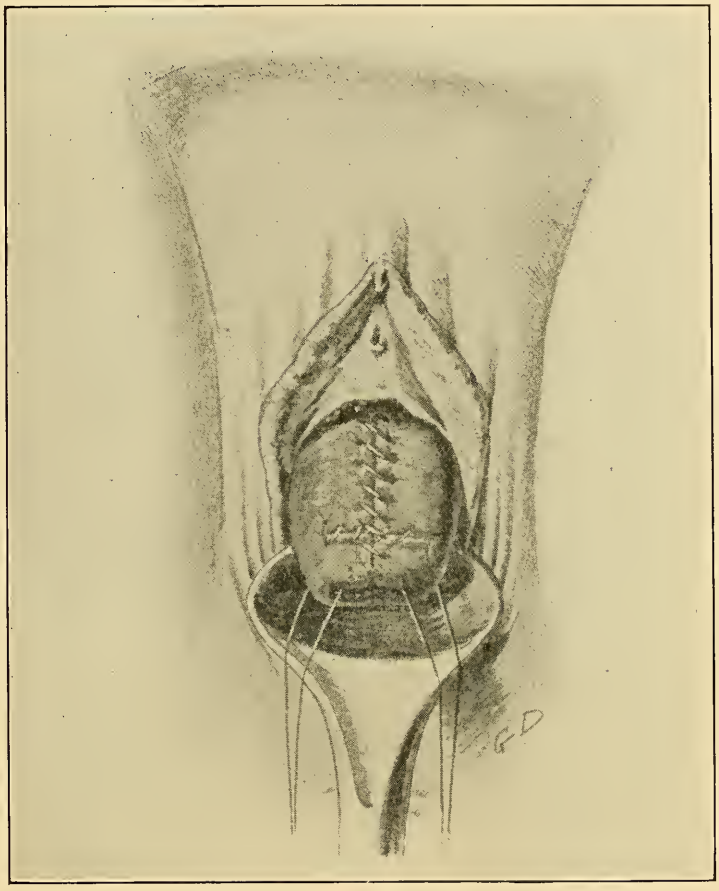

Fig. 53.—Vaginal Hysterotomy.

and in some cases the perineum must be incised to facilitate the operation. Ordinarily, however, it is a simple operation for the trained surgeon, the great difficulty in private practice being that it requires the help of two assistants besides the anesthetist, as well as a good light. It is, therefore, not well fitted for use by the general practitioner of little or no surgical experience, who often has to operate without trained assistants in emergency cases, as was recommended by Peterson a few years ago; and furthermore, its success depends on the maintenance of thorough surgi-

cal asepsis. It is distinctly a hospital operation for a trained surgeon, to be undertaken only on patients believed to be uninfected.

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